

## SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: ARDITH HERTZOG Examiner #: 71465 Date: 8/2/04  
Art Unit: 1754 Phone Number 362-1347 Serial Number: 10/681,210  
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\*\*\*\*\*

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Please see  
Inventors (please provide full names): attached  
BIB DATA SHEET  
Earliest Priority Filing Date: \_\_\_\_\_

\*For Sequence Searches Only\* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

*Please search the attached  
cls. 1-11*

*Thank you,  
Indith*

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FILE 'REGISTRY' ENTERED AT 12:48:45 ON 05 AUG 2004  
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FILE 'REGISTRY' ENTERED AT 12:00:36 ON 05 AUG 2004  
L1 329 SEA (S(L)O)/ELS (L) 2/ELC.SUB

FILE 'HCA' ENTERED AT 12:02:28 ON 05 AUG 2004  
L2 263010 SEA L1 OR SOX OR SO2 OR SO3 OR SO4 OR SO5 OR S2O OR S2O2  
OR S2O3 OR S2O4 OR S2O5 OR S3O OR S3O2 OR S3O3 OR S3O4  
OR S3O5 OR S4O OR S4O2 OR S4O3 OR S4O4 OR S4O5 OR S5O OR  
S5O2 OR S5O3 OR S5O4 OR S5O5  
L3 88775 SEA (SULFUR# OR SULFER# OR SULPHER# OR SULPHUR# OR  
S) (W) (OXIDE# OR MONOXIDE# OR DIOXIDE# OR TRIOXIDE# OR  
TETROXIDE# OR TETRAOXIDE# OR PENTOXIDE# OR PENTAOXIDE#  
OR SESQUIOXIDE#)  
L4 9022 SEA PETROLEUM#(2A) (COKE# OR COKING#)  
L5 639 SEA L4(3A) (PARTICL? OR MICROPARTICL? OR NANOPARTICL? OR  
PARTICULAT? OR MICROPARTICULAT? OR NANOPARTICULAT? OR  
DUST? OR GRIT? OR GRAIN# OR GRANUL? OR POWDER? OR SOOT?  
OR SMUT? OR FINES# OR PRILL? OR FLAKE# OR FLAKING# OR  
PELLET? OR BB#)  
L6 294 SEA (L2 OR L3) AND L4  
L7 11 SEA (L2 OR L3) AND L4 AND L5

FILE 'WPIDS' ENTERED AT 12:08:54 ON 05 AUG 2004  
L8 61644 SEA L2 OR L3  
L9 1846 SEA PETROLEUM#(2A) (COKE# OR COKING#)  
L10 312 SEA L4(3A) (PARTICL? OR MICROPARTICL? OR NANOPARTICL? OR  
PARTICULAT? OR MICROPARTICULAT? OR NANOPARTICULAT? OR  
DUST? OR GRIT? OR GRAIN# OR GRANUL? OR POWDER? OR SOOT?  
OR SMUT? OR FINES# OR PRILL? OR FLAKE# OR FLAKING# OR  
PELLET? OR BB#)  
L11 55 SEA L8 AND L9  
L12 7 SEA L8 AND L10

FILE 'HCAPLUS' ENTERED AT 12:17:28 ON 05 AUG 2004  
L13 11387 SEA JIA ?/AU  
L14 604 SEA JIA C?/AU  
L15 157495 SEA SULFUR?/TI  
L16 488104 SEA CARBON?/TI  
L17 1 SEA L14 AND L15 AND L16

L18 1803 SEA FLUID?(2A) (COKE# OR COKING#)  
L19 50258 SEA DESULFUR? OR DESULFER? OR DESULPHER? OR DESULPHUR?  
L20 83 SEA (L2 OR L3) AND L18  
L21 200 SEA L18(3A) (PARTICL? OR MICROPARTICL? OR NANOPARTICL? OR  
PARTICULAT? OR MICROPARTICULAT? OR NANOPARTICULAT? OR  
DUST? OR GRIT? OR GRAIN# OR GRANUL? OR POWDER? OR SOOT?  
OR SMUT? OR FINES# OR PRILL? OR FLAKE# OR FLAKING# OR  
PELLET? OR BB#)  
L22 5 SEA L20 AND L21  
L23 51 SEA L6 AND L19  
L24 21 SEA L20 AND L19  
L25 8 SEA L23 AND L24  
L26 2208005 SEA PARTICL? OR MICROPARTICL? OR NANOPARTICL? OR  
PARTICULAT? OR MICROPARTICULAT? OR NANOPARTICULAT? OR  
DUST? OR GRIT? OR GRAIN# OR GRANUL? OR POWDER? OR SOOT?  
OR SMUT? OR FINES# OR PRILL? OR FLAKE# OR FLAKING# OR  
PELLET? OR BB#  
L27 102 SEA L6 AND L26  
L28 28 SEA L20 AND L26  
L29 17 SEA L27 AND L19  
L30 9 SEA L28 AND L19

FILE 'WPIDS' ENTERED AT 12:40:04 ON 05 AUG 2004

L31 486 SEA FLUID?(2A) (COKE# OR COKING#)  
L32 19 SEA L8 AND L31  
L33 10 SEA L32 AND L26  
L34 3 SEA L32 AND L19  
L35 4 SEA L32 AND L11  
L36 10 SEA L11 AND L19  
L37 29 SEA L11 AND L26  
L38 27 SEA L12 OR L33 OR L34 OR L35 OR L36

FILE 'HCA' ENTERED AT 12:47:50 ON 05 AUG 2004

L39 26 SEA L7 OR L22 OR L25 OR L30  
L40 13 SEA L29 NOT L39

=> file hca

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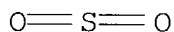
=> d 139 1-26 cbib abs hitstr hitind

L39 ANSWER 1 OF 26 HCA COPYRIGHT 2004 ACS on STN

140:425943 Heat generation from high sulfur-containing carbonaceous

fuels. Jia, Charles Q.; Kirk, Donald W. (Can.). U.S. Pat. Appl. Publ. US 2004109820 A1 20040610, 5 pp. (English). CODEN: USXXCO. APPLICATION: US 2003-681209 20031009. PRIORITY: CA 2002-2413563 20021204.

- AB Heat is generated by the combustion of high sulfur-contg. carbonaceous fuels, esp. coal and **fluid coke**. The process includes treating a feed carbonaceous fuel having a 1st bound-sulfur content with an effective amt. of an oxygen and **SO2**-contg. gas in a reactor at an effective temp. to (i) provide elemental sulfur from the **SO2**, (ii) release exothermic heat, and (iii) produce a hot effluent gaseous stream contg. the elemental sulfur and treated fuel having a 2nd bound-sulfur content, (b) sepg. the elemental sulfur from the treated fuel; (c) collecting the elemental sulfur; (d) collecting the treated fuel; and (e) collecting the exothermic heat.
- IT **7446-09-5, Sulfur dioxide**, reactions  
(power generation from sulfur-contg. carbonaceous fuels)
- RN 7446-09-5 HCA
- CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



- IC ICM F23J011-00  
ICS C01B017-02
- NCL 423569000; 110345000
- CC 51-18 (Fossil Fuels, Derivatives, and Related Products)  
Section cross-reference(s): 59
- ST coal coke combustion **desulfurization** sulfur formation flue gas
- IT Coal treatment  
(**desulfurization**; power generation from sulfur-contg. carbonaceous fuels)
- IT **Coke**  
(**fluidized**; power generation from sulfur-contg. carbonaceous fuels)
- IT Combustion  
Flue gas **desulfurization**  
Heat  
(power generation from sulfur-contg. carbonaceous fuels)
- IT **Petroleum coke**  
(power generation from sulfur-contg. carbonaceous fuels)
- IT **7446-09-5, Sulfur dioxide**, reactions  
(power generation from sulfur-contg. carbonaceous fuels)
- L39 ANSWER 2 OF 26 HCA COPYRIGHT 2004 ACS on STN  
139:352449 Combustion and deposit formation behavior on the fireside surfaces of a pulverized fuel boiler fired with a blend of coal and

**petroleum coke.** Srikanth, S.; Rao, D. S.; Das, Swapan K.; Ravikumar, B.; Nandakumar, K.; Dhanuskodi, R.; Vijayan, P. (National Metallurgical Laboratory, Madras Centre, Chennai, India). Combustion Science and Technology, 175(9), 1625-1647 (English) 2003. CODEN: CBSTB9. ISSN: 0010-2202. Publisher: Taylor & Francis, Inc..

- AB The thermochem. of the combustion of a blend of coal and 5% **petroleum coke** was analyzed. Thermodyn. modeling and microscopic techniques were used to study the behavior of the inorg. constituents upon combustion of the blend of coal and **petroleum coke**. The chem. compn. and phase constitution of the combustion products, as well as the deposits at several temps. corresponding to those at the various parts of the boiler, were deduced by free-energy minimization. These results were compared with actual results obtained from a com. pulverized fuel boiler fired with coal and **petroleum coke** blend. The deposits on the fireside surfaces of the boiler tubes in the various parts (water walls, platen superheater, final superheater, economizer, and electrostatic precipitator) of the com. pulverized fuel boiler fired with coal and 5% **petroleum coke** were characterized by **particle** size anal., chem. anal., x-ray diffraction, optical microscopy, and SEM. The combustion gas compn. was measured using a portable online gas analyzer for N<sub>2</sub>, O<sub>2</sub>, CO<sub>2</sub>, H<sub>2</sub>O, CO, NO, and SO<sub>2</sub>. The thermodynamically predicted compns. and phase constitutions for the gas phase as well as the condensed phases are in good agreement with the exptl. results.
- CC 51-18 (Fossil Fuels, Derivatives, and Related Products)
- ST combustion deposit pulverized fuel boiler coal **petroleum coke**
- IT Boilers  
Combustion  
Thermodynamic simulation  
(combustion and deposit formation behavior on the fireside surfaces of pulverized fuel boiler fired with blend of coal and **petroleum coke**)
- IT **Petroleum coke**  
(combustion and deposit formation behavior on the fireside surfaces of pulverized fuel boiler fired with blend of coal and **petroleum coke**)
- IT Ashes (residues)  
(deposits; combustion and deposit formation behavior on the fireside surfaces of pulverized fuel boiler fired with blend of coal and **petroleum coke**)

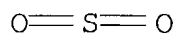
Zhang, Chunlin; Liu, Dechang; Chen, Hanping; Zhang, Shihong (Natl. Key Lab. of Coal Combustion, Huazhong Univ. of Sci. Technol., Wuhan, 430074, Peop. Rep. China). Huagong Xuebao (Chinese Edition), 54(7), 1032-1034 (Chinese) 2003. CODEN: HUKHAI. ISSN: 0438-1157. Publisher: Huaxue Gongye Chubanshe, Huagong Xuebao Bianjibu.

- AB **Petroleum coke** has high nitrogen and high sulfur. Its combustion will cause pollution to atm. This paper studies the characteristics of **SO<sub>2</sub>** emission and NO<sub>x</sub> emission during the combustion of **petroleum coke** and **desulfuration** processes and discusses the effect of limestone on NO<sub>x</sub> emission. Considering **desulfuration**, denitration and operating costs of boilers, there is an appropriate Ca/S mole ratio for the combustion and **desulfuration** of **petroleum coke**. It provides a practical basis for industrial utilization of **petroleum coke**.
- IT 7446-09-5, Sulfur dioxide, processes  
(effects of **desulfuration** on NO<sub>x</sub> emission during combustion of **petroleum coke** in **fluidized** bed boilers)
- RN 7446-09-5 HCA
- CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

- CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 48, 51
- ST limestone **desulfuration** nitrogen oxide emission combustion **petroleum coke** boiler
- IT Fluidized beds  
(boilers, recirculating; effects of **desulfuration** on NO<sub>x</sub> emission during combustion of **petroleum coke** in **fluidized** bed boilers)
- IT Combustion gases  
**Desulfurization**  
(effects of **desulfuration** on NO<sub>x</sub> emission during combustion of **petroleum coke** in **fluidized** bed boilers)
- IT **Petroleum coke**  
(effects of **desulfuration** on NO<sub>x</sub> emission during combustion of **petroleum coke** in **fluidized** bed boilers)
- IT Limestone, reactions  
(effects of **desulfuration** on NO<sub>x</sub> emission during combustion of **petroleum coke** in **fluidized** bed boilers)
- IT Boilers  
(fluidized-bed, recirculating; effects of **desulfuration**

- on NOx emission during combustion of **petroleum coke** in **fluidized** bed boilers)
- IT 7446-09-5, **Sulfur dioxide**, processes  
(effects of **desulfuration** on NOx emission during combustion of **petroleum coke** in **fluidized** bed boilers)
- IT 11104-93-1, NOx, processes  
(effects of **desulfuration** on NOx emission during combustion of **petroleum coke** in **fluidized** bed boilers)
- L39 ANSWER 4 OF 26 HCA COPYRIGHT 2004 ACS on STN
- 138:308344 Kinetic and mechanistic study on carbothermal reduction of **sulfur dioxide** with oil sands **fluid coke**. Bejarano, Cesar; Jia, Charles Q. (Department of Chemical Engineering and Applied Chemistry, University of Toronto, Toronto, ON, M5S 3E5, Can.). Proceedings of the Air & Waste Management Association's Annual Conference & Exhibition, 94th, Orlando, FL, United States, June 24-28, 2001, 1500-1512. Air & Waste Management Association: Pittsburgh, Pa. ISBN: 0-923204-39-3 (English) 2001. CODEN: 69DMIS.
- AB A sulfur-producing flue gas **desulfurization** (SP-FGD) process removes **SO2** from flue gases and converts it into elemental sulfur. Carbothermal redn. is a reducing reaction with carbonaceous materials at high temps. Oil-sand **fluid coke** is being produced and stockpiled during upgrading oil sands bitumen to synthetic crude oil. Aiming at the development of an SP-FGD process, the redn. of **SO2** by oil sands **fluid coke** at high temps. ( $> 600\text{ }^{\circ}\text{C}$ ) was investigated exptl. under pseudo-steady state and unsteady state conditions. The shrinking core model (SCM) was applied to evaluate the rate of the overall reaction at various temps. It was found that the coke was capable of reducing **SO2** with an activation energy of 154 kJ/mol. A complete removal of **SO2** was achievable within seconds under certain conditions. The scanning electronic microscopy (SEM) anal. revealed that there was an ash layer on the surface of coke **particles** after reaction. The ash layer might represent a major resistance to the overall reaction after a significant fraction of the coke was consumed. Implications of the research and the need of further study are also discussed.
- IT 7446-09-5, **Sulfur dioxide**, processes  
(kinetics and mechanisms of carbothermal redn. of **sulfur dioxide** with oil sands **fluid coke** in)
- RN 7446-09-5 HCA
- CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



- CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 51
- ST **sulfur dioxide** removal flue gas carbothermal  
redn **fluid coke**; flue gas  
**desulfurization** carbothermal redn oil sand **fluid**  
**coke**
- IT Reduction  
(carbothermal; kinetics and mechanisms of carbothermal redn. of  
**sulfur dioxide** with oil sands **fluid**  
**coke** in)
- IT Oil sand bitumens  
(**fluid coke** from upgrading of; kinetics and  
mechanisms of carbothermal redn. of **sulfur**  
**dioxide** with oil sands **fluid coke** in)
- IT Flue gas **desulfurization**  
(kinetics and mechanisms of carbothermal redn. of **sulfur**  
**dioxide** with oil sands **fluid coke** in)
- IT Reaction kinetics  
(of carbothermal redn.; kinetics and mechanisms of carbothermal  
redn. of **sulfur dioxide** with oil sands  
**fluid coke** in)
- IT **Coke**  
(oil-sands **fluid**; kinetics and mechanisms of  
carbothermal redn. of **sulfur dioxide** with oil  
sands **fluid coke** in)
- IT Simulation and Modeling, physicochemical  
(shrinking core model; kinetics and mechanisms of carbothermal  
redn. of **sulfur dioxide** with oil sands  
**fluid coke** in)
- IT 7446-09-5, **Sulfur dioxide**, processes  
(kinetics and mechanisms of carbothermal redn. of **sulfur**  
**dioxide** with oil sands **fluid coke** in)

L39 ANSWER 5 OF 26 HCA COPYRIGHT 2004 ACS on STN

137:339845 Adsorption removal of pollutants by active cokes produced from sludge in the energy recycle process of wastes. Kojima, Naozumi; Mitomo, Aki; Itaya, Yoshinori; Mori, Shigekatsu; Yoshida, Shuichi (Department of Chemical Engineering, Nagoya University, Nagoya, 464-8603, Japan). Waste Management (Amsterdam, Netherlands), 22(4), 399-404 (English) 2002. CODEN: WAMAE2. ISSN: 0956-053X. Publisher: Elsevier Science B.V..

AB This study proposes a recycling system of sludge into active cokes and the fundamental examns. for the application were carried out. In the system, active cokes were produced by carbonizing



**pellets** of sludge in a steam stream. Pyrolysis gas yielded by carbonization can be available as a fuel for a steam generation boiler. The exhaust heat from the boiler is used sequentially for drying of sludge. The active cokes are applied to the adsorbent for dioxin removal in exhaust gas from incinerators of wastes, or for purifn. of gas obtained in a gasification process of wastes, particularly removal of H<sub>2</sub>S. The used adsorbent is not recycled, but incinerated in the furnace without a desorption process to decomp. adsorbed dioxin or to oxidize H<sub>2</sub>S for a sequential

**desulfurization** process of SO<sub>2</sub>. Dry

**pellets** of sludge were carbonized in a quartz tube reactor under various atmospheres. The micro pore structure and the adsorption performance of the cokes produced without activation process were examd. The micro pore structure was influenced by the temp., the sort of flow gas (N<sub>2</sub>, CO<sub>2</sub> and steam) and carbonization time, and the active cokes produced under the condition of the temp. 823 K for 60 min in the steam atm. had a largest sp. surface area in the diam. less than 5 nm. The amt. of benzene adsorption as an alternative substance of dioxin into the active cokes had a similar quality to a com. active char produced from coal if it was evaluated by adsorption per a unit sp. surface area. This fundamental knowledge must be reflected to an optimum design for development of a simple continuous process to produce the active **cokes** by a **fluidized** bed type of the carbonization furnace.

CC 52-1 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 49

ST active **coke** municipal sludge **fluidized** bed  
carbonization

L39 ANSWER 6 OF 26 HCA COPYRIGHT 2004 ACS on STN

137:234696 Fate of sulfur during carbothermal reduction of SO<sub>2</sub>

(g) using oil-sands **fluid coke**. Bejarano, Cesar; Jia, Charles Q. (Department of Chemical Engineering and Applied Chemistry, University of Toronto, Toronto, ON, M5S 3E5, Can.). Waste Processing and Recycling in Mineral and Metallurgical Industries IV, Proceedings of the International Symposium on Waste Processing and Recycling in Mineral and Metallurgical Industries, 4th, Toronto, ON, Canada, Aug. 26-29, 2001, 103-123. Editor(s): Rao, S. Ramachandra. Canadian Institute of Mining, Metallurgy and Petroleum: Montreal, Que. ISBN: 1-894475-14-3 (English) 2001. CODEN: 69CRPB.

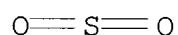
AB Aiming at the development of an oil-sand **fluid coke**-based sulfur-producing flue gas **desulfurization** (SP-FGD) technol., the redn. of SO<sub>2</sub> by the coke at high temps. was investigated. It was established that a carbothermal redn. of SO<sub>2</sub> with coke was a fast reaction and could be completed within seconds. Elemental sulfur was the predominant product if the over redn. was prevented. The present paper focuses

on the fate of sulfur during the carbothermal redn. Sulfur balance is analyzed with data obtained using a total sulfur analyzer and a gas chromatograph (GC-TCD). A scanning electron microscope (SEM-EDS) was used to characterize the surface and cross section of coke **particles** before and after the reaction. An ash layer, which is low in sulfur, was found on the surface of partially reacted coke **particles** surface. At the ash-coke interface, however, there was a build-up of sulfur. In addn., an x-ray photoelectron spectroscope (XPS) was utilized to identify the chem. state of sulfur in the coke and the ash layer.

IT 7446-09-5, Sulfur dioxide, reactions  
(prodn. of sulfur during carbothermal redn. of gaseous sulfur dioxide using oil-sand fluid coke)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



CC 49-1 (Industrial Inorganic Chemicals)

ST sulfur carbothermal redn sulfur dioxide coke;  
flue gas desulfurization carbothermal redn sulfur prodn;  
ash coke layer sulfur detn XPS

IT Reduction  
(carbothermic; prodn. of sulfur during carbothermal redn. of gaseous sulfur dioxide using oil-sand fluid coke)

IT Ashes (residues)  
X-ray photoelectron spectroscopy  
(detn. of sulfur in coke and ash layer by x-ray photoelectron spectroscope during carbothermal redn. of gaseous sulfur dioxide using oil-sand fluid coke to produce sulfur)

IT Flue gas desulfurization  
(prodn. of sulfur during carbothermal redn. of gaseous sulfur dioxide using oil-sand fluid coke)

IT Coke  
(prodn. of sulfur during carbothermal redn. of gaseous sulfur dioxide using oil-sand fluid coke)

IT 7704-34-9P, Sulfur, preparation  
(prodn. of sulfur during carbothermal redn. of gaseous sulfur dioxide using oil-sand fluid coke)

IT 7446-09-5, Sulfur dioxide, reactions  
(prodn. of sulfur during carbothermal redn. of gaseous

**sulfur dioxide using oil-sand fluid  
coke)**

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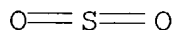
136:138950 Eliminating a sulfuric acid mist plume from a wet caustic scrubber on a **petroleum coke** calciner. Brown, Charles A.; Hohne, Paul A. (VECO Pacific, Inc., Bellingham, WA, 98227, USA). Environmental Progress, 20(3), 182-186 (English) 2001. CODEN: ENVPDI. ISSN: 0278-4491. Publisher: American Institute of Chemical Engineers.

AB Reducing H<sub>2</sub>SO<sub>4</sub> mist emissions and eliminating the visible plume which remained after steam dissipation were the objectives of a project completed for a **petroleum coke** calciner. The coke calciner produced flue gas contg. SO<sub>2</sub> treated with a wet caustic scrubber. The scrubber was extremely efficient at removing most of the SO<sub>2</sub>, but some oxidized to SO<sub>3</sub>, catalyzed by V in the coke dust which collected in the waste heat boiler. Sub-micron H<sub>2</sub>SO<sub>4</sub> droplets form when flue gas is quenched by the scrubber liquor, making its way through the scrubber. Installation of and performance test results for a wet electrostatic precipitator (WESP) and SO<sub>2</sub> scrubber modifications required to make room for the WESP are discussed. This successful project significantly reduced H<sub>2</sub>SO<sub>4</sub> mist emissions, eliminating the visible plume while maintaining a very low SO<sub>2</sub> outlet concn., even after 1 of 3 gas-liq. contactors were removed.

IT 7446-09-5, Sulfur dioxide, processes  
(wet electrostatic precipitator removal of **sulfur dioxide**, sulfuric acid mist, and **particulate** matter from **petroleum coke** calciner flue gas following wet caustic scrubbing)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 51

ST **petroleum coke** calciner flue gas sulfuric acid mist removal; **sulfur dioxide** removal coke calciner flue gas; caustic wet scrubbing removal flue gas **sulfur dioxide**; wet electrostatic precipitator flue gas particulate removal

IT **Petroleum coke**  
(calcination of; wet electrostatic precipitator removal of **sulfur dioxide**, sulfuric acid mist, and **particulate** matter from **petroleum coke**

- calciner flue gas following wet caustic scrubbing)
- IT Furnaces  
(calcining furnaces, **petroleum coke**; wet electrostatic precipitator removal of **sulfur dioxide**, sulfuric acid mist, and **particulate** matter from **petroleum coke** calciner flue gas following wet caustic scrubbing)
- IT Wet scrubbing  
(caustic; wet electrostatic precipitator removal of **sulfur dioxide**, sulfuric acid mist, and **particulate** matter from **petroleum coke** calciner flue gas following wet caustic scrubbing)
- IT Air pollution  
(control; wet electrostatic precipitator removal of **sulfur dioxide**, sulfuric acid mist, and **particulate** matter from **petroleum coke** calciner flue gas following wet caustic scrubbing)
- IT Particles  
(flue gas; wet electrostatic precipitator removal of **sulfur dioxide**, sulfuric acid mist, and **particulate** matter from **petroleum coke** calciner flue gas following wet caustic scrubbing)
- IT Flue gases  
(**petroleum coke** calciner; wet electrostatic precipitator removal of **sulfur dioxide**, sulfuric acid mist, and **particulate** matter from **petroleum coke** calciner flue gas following wet caustic scrubbing)
- IT Electrostatic precipitation apparatus  
(wet; wet electrostatic precipitator removal of **sulfur dioxide**, sulfuric acid mist, and **particulate** matter from **petroleum coke** calciner flue gas following wet caustic scrubbing)
- IT 7664-93-9, Sulfuric acid, processes  
(mist; wet electrostatic precipitator removal of **sulfur dioxide**, sulfuric acid mist, and **particulate** matter from **petroleum coke** calciner flue gas following wet caustic scrubbing)
- IT 7446-09-5, **Sulfur dioxide**, processes  
(wet electrostatic precipitator removal of **sulfur dioxide**, sulfuric acid mist, and **particulate** matter from **petroleum coke** calciner flue gas following wet caustic scrubbing)

L39 ANSWER 8 OF 26 HCA COPYRIGHT 2004 ACS on STN

136:41844 Design considerations of the 2 + 150 MW Formosa Heavy Industry Corporation CFB boiler and NID system. Tsiou, Charlie G. C.; Pisano, John A.; Wiktorsson, Anders; Ahman, Stefan (Formosa

Heavy Industry Corporation, Kaohsiung, Taiwan). Proceedings of the International Conference on Fluidized Bed Combustion, 16th, 563-584 (English) 2001. CODEN: PCFCDB. ISSN: 0197-453X. Publisher: American Society of Mechanical Engineers.

AB A circulating fluidized bed (CFB) project where ALSTOM Power is delivering two 150 MW CFB Boilers to Formosa Heavy Industry Corp. (FHIC) for the Formosa Petrochem. Corporation Mai-Liao Refinery, Taiwan, is described. The fuel is **petroleum coke** with a very high S content,  $\leq 6.5\%$ , which will be burned alone or with residual oil. Very stringent demands on **SO<sub>2</sub>** emissions were mandated: the **SO<sub>2</sub>** concn. must be  $< 200$  ppm (at 6% O<sub>2</sub>) leaving the boiler and 50 ppm (at 6% O<sub>2</sub>) at the stack. To facilitate these requirements, a 2-stage approach for S removal was selected. Limestone is added to the CFB boiler to remove the bulk of S during combustion. This is followed by a secondary polishing step, where addnl. **SO<sub>2</sub>** is absorbed in a newly developed novel integrated **desulfurization** (NID) flue gas **desulfurization** (FGD) system. A unique feature of this system is the ability to activate CFB ash for S removal in the FGD system. Pilot plant operating results indicated limestone addn. to the CFB boiler can be significantly reduced by using CFB ash to remove S from the FGD system. When the CFB boiler is placed into operation in 2001, the practical limits for this technol. will be examd.

IT 7446-09-5, Sulfur dioxide, processes  
(design of two-stage, **petroleum coke**/residual oil-fired circulating fluidized boiler and integrated flue gas **desulfurization** system, Formosa Petrochem. Corporation Refinery, Taiwan)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 51

ST circulating fluidized bed boiler flue gas emission; integrated flue gas **desulfurization** circulating fluidized bed boiler; **petroleum coke** fired circulating **fluidized** bed boiler; limestone addn fluidized bed flue gas **desulfurization**

IT Design  
(design of two-stage, **petroleum coke**/residual oil-fired circulating fluidized boiler and integrated flue gas **desulfurization** system, Formosa Petrochem. Corporation Refinery, Taiwan)

IT Limestone, reactions

(design of two-stage, **petroleum coke**/residual oil-fired circulating fluidized boiler and integrated flue gas **desulfurization** system, Formosa Petrochem. Corporation Refinery, Taiwan)

IT **Particles**

(flue gas; design of two-stage, **petroleum coke**/residual oil-fired circulating fluidized boiler and integrated flue gas **desulfurization** system, Formosa Petrochem. Corporation Refinery, Taiwan)

IT **Flue gases**

(fluidized bed boiler; design of two-stage, **petroleum coke**/residual oil-fired circulating fluidized boiler and integrated flue gas **desulfurization** system, Formosa Petrochem. Corporation Refinery, Taiwan)

IT **Boilers**

(fluidized-bed, circulating; design of two-stage, **petroleum coke**/residual oil-fired circulating fluidized boiler and integrated flue gas **desulfurization** system, Formosa Petrochem. Corporation Refinery, Taiwan)

IT **Ashes (residues)**

(fuel contg.; design of two-stage, **petroleum coke**/residual oil-fired circulating fluidized boiler and integrated flue gas **desulfurization** system, Formosa Petrochem. Corporation Refinery, Taiwan)

IT **Petroleum coke**

(fuel; design of two-stage, **petroleum coke**/residual oil-fired circulating fluidized boiler and integrated flue gas **desulfurization** system, Formosa Petrochem. Corporation Refinery, Taiwan)

IT **Flue gas desulfurization**

(integrated; fluidized bed boiler; design of two-stage, **petroleum coke**/residual oil-fired circulating fluidized boiler and integrated flue gas **desulfurization** system, Formosa Petrochem. Corporation Refinery, Taiwan)

IT **Petroleum, uses**

(residual; fuel; design of two-stage, **petroleum coke**/residual oil-fired circulating fluidized boiler and integrated flue gas **desulfurization** system, Formosa Petrochem. Corporation Refinery, Taiwan)

IT 630-08-0, Carbon monoxide, processes 7446-09-5, **Sulfur dioxide**, processes 11104-93-1, Nitrogen oxide, processes 12624-32-7, **Sulfur oxide**

(design of two-stage, **petroleum coke**/residual oil-fired circulating fluidized boiler and integrated flue gas **desulfurization** system, Formosa Petrochem. Corporation Refinery, Taiwan)

IT 7778-18-9, Calcium sulfate

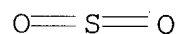
(design of two-stage, **petroleum coke**/residual

- oil-fired circulating fluidized boiler and integrated flue gas **desulfurization** system, Formosa Petrochem. Corporation Refinery, Taiwan)
- IT 1305-62-0, Calcium hydroxide, reactions 1305-78-8, Calcium oxide, reactions  
(design of two-stage, **petroleum coke**/residual oil-fired circulating fluidized boiler and integrated flue gas **desulfurization** system, Formosa Petrochem. Corporation Refinery, Taiwan)
- IT 1333-74-0, Hydrogen, occurrence 7440-44-0, Carbon, occurrence  
7704-34-9, Sulfur, occurrence 7727-37-9, Nitrogen, occurrence  
7732-18-5, Water, occurrence 7782-44-7, Oxygen, occurrence  
(fuel contg.; design of two-stage, **petroleum coke**/residual oil-fired circulating fluidized boiler and integrated flue gas **desulfurization** system, Formosa Petrochem. Corporation Refinery, Taiwan)
- L39 ANSWER 9 OF 26 HCA COPYRIGHT 2004 ACS on STN  
133:210444 Evaluation of PRB subbituminous coal-**petroleum coke** blending on fouling and slagging. Galbreath, Kevin C.; Zygarlicke, Christopher J.; Toman, Donald L. (Energy & Environmental Research Center, University of North Dakota, Grand Forks, ND, 58202, USA). Proceedings of the International Technical Conference on Coal Utilization & Fuel Systems, 24th, 293-302 (English) 1999. CODEN: PTCSTF. Publisher: Coal & Slurry Technology Association.
- AB The effects of blending **petroleum** shot **coke** with two Powder River Basin (PRB) subbituminous coals on ash fouling and slagging were evaluated using two lab.-scale (fuel feed rates of  $\approx 6$  g/h and 2 kg/h) combustion systems. Deposits from coal-**petroleum coke** blends of 100:0, 90:10, and 80:20 on a coal:coke wt. basis were generated under fouling and slagging conditions. Measurements of fouling deposit growth rates and slag deposit compressive strengths indicate that **petroleum coke** blending with PRB subbituminous coal impedes the rate of ash deposition but promotes slag deposit strength. A vanadium K-edge x-ray absorption fine structure spectroscopy anal. of a fly ash sample indicates that vanadium, generally the dominant inorg. component of **petroleum coke**, is present in a pentavalent oxidn. state (V5+), most likely as a metal vanadate compd. Sulfur analyses of combustion flue gases and fly ashes indicate that **petroleum coke** blending promotes the conversion of fuel sulfur to inorg. sulfate (**SO4**) compds. in the fly ash. V5+ catalysis of **SO2**(g) oxidn. followed by **SO3**(g) reaction with lime (CaO) to form anhydrite (CaSO4) is the dominant ash sulfation mechanism.
- IT 7446-09-5, Sulfur dioxide, reactions  
7446-11-9, Sulfur trioxide, reactions

(catalysis of **SO2** oxidn. and **SO3** reaction  
with CaO; in study of combustion of Powder River Basin  
subbituminous coal-**petroleum coke** blend and  
fouling and slagging)

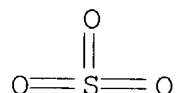
RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



RN 7446-11-9 HCA

CN Sulfur trioxide (8CI, 9CI) (CA INDEX NAME)



CC 51-18 (Fossil Fuels, Derivatives, and Related Products)

ST subbituminous coal **petroleum coke** combustion  
fouling; slagging bituminous coal **petroleum coke**  
combustion

IT Lime (chemical)

(catalysis of **SO2** oxidn. and **SO3** reaction  
with CaO; in study of combustion of Powder River Basin  
subbituminous coal-**petroleum coke** blend and  
fouling and slagging)

IT Combustion

Fouling

Slags

(combustion of Powder River Basin subbituminous coal-  
**petroleum coke** blend and fouling and slagging)

IT Ashes (residues)

(fly; combustion of Powder River Basin subbituminous coal-  
**petroleum coke** blend and fouling and slagging)

IT 7440-62-2, Vanadium, uses

(catalysis of **SO2** oxidn. and **SO3** reaction  
with CaO; in study of combustion of Powder River Basin  
subbituminous coal-**petroleum coke** blend and  
fouling and slagging)

IT 14798-04-0, Anhydrite

(catalysis of **SO2** oxidn. and **SO3** reaction  
with CaO; in study of combustion of Powder River Basin  
subbituminous coal-**petroleum coke** blend and  
fouling and slagging)

IT 7446-09-5, Sulfur dioxide, reactions

7446-11-9, Sulfur trioxide, reactions

(catalysis of **SO2** oxidn. and **SO3** reaction



with CaO; in study of combustion of Powder River Basin subbituminous coal-**petroleum coke** blend and fouling and slagging)

L39 ANSWER 10 OF 26 HCA COPYRIGHT 2004 ACS on STN

126:267846 Methods for suppressing dust emissions. Bair, Keith A.; Bissinger, Elizabeth V.; Roe, Donald C. (Betz Laboratories, Inc., USA). Can. Pat. Appl. CA 2173168 AA 19961213, 17 pp. (English). CODEN: CPXXEB. APPLICATION: CA 1996-2173168 19960401. PRIORITY: US 1995-489906 19950612.

AB Methods for suppressing the dissemination of dust emissions from dust-producing materials, e.g., rocks, green and calcined **petroleum coke**, ores, limestone, gypsum, cement, and the like, are described. Fugitive dust emissions are suppressed by applying aq. solns. of a graft copolymer obtained by graft copolymerizing cationic monomers onto polyvinyl alc. to dust-producing materials.

IC ICM C09K003-22

CC 59-2 (Air Pollution and Industrial Hygiene)

IT Limestone, occurrence

**Petroleum coke**

Rocks

(**dust**; methods for suppressing dust emissions)

IT 13397-24-5, Gypsum (Ca(SO<sub>4</sub>).2H<sub>2</sub>O), occurrence

(**dust**; methods for suppressing dust emissions)

L39 ANSWER 11 OF 26 HCA COPYRIGHT 2004 ACS on STN

125:203672 Demonstration of pelletized fly ash reinjection for reduction of limestone consumption and ash disposal. Moe, Thomas A.; Mann, Michael D.; Hajicek, Douglas H.; Henderson, Ann K.; Swanson, Michael L.; Weiss, Alfred J. (Energy & Environmental Research Center, University of North Dakota, Grand Forks, ND, USA). Proceedings of the International Conference on Fluidized Bed Combustion, 13th (Vol. 2), 1267-1274 (English) 1995. CODEN: PCFCDB. ISSN: 0197-453X. Publisher: American Society of Mechanical Engineers.

AB The Energy & Environmental Research Center (EERC) demonstrated a technol. conceived by Community Energy Alternatives Incorporated (CEA) to reduce limestone consumption and solid waste disposal requirements from a circulating fluidized-bed combustor (CFBC) operating on **fluid petroleum coke**. Testing was designed to investigate the potential for reduced limestone use through pelletization of collected fly ash and subsequent recycle to the CFBC. To produce representative results, **fluid petroleum coke** and limestone from one of CEA's GWF Power Systems Corporation plants were used as feedstock for the EERC 1-MW CFBC. All fly ash generated from CFBC operation was collected, pelletized, and recycled to the combustor to enhance sorbent use. Testing proceeded through 5 cycles using

pellets made from fly ash generated from the preceding test. Limestone use was reduced .apprx.24% from the baseline limestone-only test, to the fifth cycle at similar S capture efficiencies and total Ca:S ratios. Ca use increased from 30.7% during the baseline test to 38.5% for the fifth cycle. Other advantages demonstrated include improved C burnout, higher boiler efficiencies, and lower NOx, N2O, and CO2 emissions.

IT 7446-09-5, **Sulfur dioxide**, processes  
 (flue gas; pelletized fly ash reinjection to reduce limestone consumption and ash disposal of circulating fluidized-bed combustor with **fluid petroleum coke** fuel)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

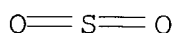
O=S=O

CC 60-5 (Waste Treatment and Disposal)  
 Section cross-reference(s): 51, 59  
 ST pelletized fly ash reinjection combustor; circulating fluidized bed combustor ash reinjection; reduced limestone consumption fly ash reinjection; **fluid petroleum coke**  
**fluidized** bed combustor; flue gas pollutant fluidized bed combustor  
 IT Pellets  
 (fly ash; pelletized fly ash reinjection to reduce limestone consumption and ash disposal of circulating fluidized-bed combustor with **fluid petroleum coke** fuel)  
 IT Limestone, uses  
 (pelletized fly ash reinjection to reduce limestone consumption and ash disposal of circulating fluidized-bed combustor with **fluid petroleum coke** fuel)  
 IT Sulfation  
 (potential of fly ash reinjection for; pelletized fly ash reinjection to reduce limestone consumption and ash disposal of circulating fluidized-bed combustor with **fluid petroleum coke** fuel)  
 IT Fluidized beds and systems  
 (combustors, circulating; pelletized fly ash reinjection to reduce limestone consumption and ash disposal of circulating fluidized-bed combustor with **fluid petroleum coke** fuel)  
 IT Combustion  
 (fluidized-bed, app., circulating; pelletized fly ash reinjection to reduce limestone consumption and ash disposal of circulating fluidized-bed combustor with **fluid petroleum**

- coke fuel)**
- IT Ashes (residues)  
(fly, sorbent supplement; pelletized fly ash reinjection to reduce limestone consumption and ash disposal of circulating fluidized-bed combustor with **fluid petroleum coke fuel)**
- IT **Coke**  
(**petroleum, fluid; pelletized fly** ash reinjection to reduce limestone consumption and ash disposal of circulating fluidized-bed combustor with **fluid petroleum coke fuel)**
- IT 124-38-9, Carbon dioxide, processes 630-08-0, Carbon monoxide, processes **7446-09-5, Sulfur dioxide**, processes 10024-97-2, Nitrous oxide, processes 11104-93-1, Nitrogen oxide, processes  
(flue gas; pelletized fly ash reinjection to reduce limestone consumption and ash disposal of circulating fluidized-bed combustor with **fluid petroleum coke fuel)**
- IT 1305-78-8, Calcium oxide, occurrence 1313-99-1, Nickel oxide, occurrence 1314-62-1, Vanadium oxide (V2O5), occurrence 7778-18-9, Calcium sulfate  
(pelletized fly ash recycling effect on chem. compn. of pellets in circulating fluidized-bed combustor with **fluid petroleum coke fuel)**
- IT 7704-34-9, Sulfur, processes  
(pelletized fly ash reinjection to reduce limestone consumption and ash disposal of circulating fluidized-bed combustor with **fluid petroleum coke fuel)**
- L39 ANSWER 12 OF 26 HCA COPYRIGHT 2004 ACS on STN  
124:210392 Regeneration and reuse of a lime-based sorbent for **sulfur oxides**. Jagtap, S. B.; Wheelock, T. D.  
(Engineering Research Institute, Iowa State University, Ames, IA, 50011, USA). Preprints of Papers - American Chemical Society, Division of Fuel Chemistry, 41(2), 614-16 (English) 1996. CODEN: ACFPAI. ISSN: 0569-3772. Publisher: American Chemical Society, Division of Fuel Chemistry.
- AB The feasibility of regenerating and reusing lime used as a sorbent for **SOx** in an industrial, circulating fluidized-bed boiler fired with petroleum coke was studied. Since the sorbent is converted to CaSO4 in the boiler, regeneration requires converting CaSO4 back to CaO. Previous studies showed that this conversion can be achieved using reductive decompn. with CO; it is also possible to produce byproduct **SO2** in sufficient concn. for conversion into H2SO4. Samples of sulfated bed ash and fly ash were subjected to a no. of regeneration and sulfation cycles; changes in the apparent reactivity and sorptive capacity of the materials were

obsd. Results showed it is feasible to regenerate and recycle sulfated bed ash produced by burning petroleum **coke** in a **fluidized**-bed of limestone **particles**. Although a decline in the sulfation capacity of bed ash particles as the no. of sulfation and regeneration cycles increased, it was still possible to recover  $\geq 30\%$  of the CaO to CaSO<sub>4</sub> after 5 cycles. Regeneration was always more rapid than sulfation, and it was nearly always complete.

- IT 7446-09-5P, Sulfur dioxide, formation  
(nonpreparative)  
(regeneration and reuse of lime-based **sulfur oxides** sorbent in petroleum **coke**-fired circulating **fluidized**-bed boiler)
- RN 7446-09-5 HCA
- CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



- CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 51
- ST **sulfur oxide** lime sorbent regeneration reuse;  
fluidized bed boiler lime **sulfur oxide**;  
petroleum **coke** fired **fluidized** bed boiler;  
sulfuric acid prodn **sulfur dioxide** byproduct;  
sulfated boiler fly ash bottom ash
- IT Boilers  
(fluidized-bed; regeneration and reuse of lime-based **sulfur oxides** sorbent in petroleum **coke**-fired circulating **fluidized**-bed boiler)
- IT Ashes (residues)  
Sorption  
(regeneration and reuse of lime-based **sulfur oxides** sorbent in petroleum **coke**-fired circulating **fluidized**-bed boiler)
- IT Lime (chemical)  
(regeneration and reuse of lime-based **sulfur oxides** sorbent in petroleum **coke**-fired circulating **fluidized**-bed boiler)
- IT Ashes (residues)  
(fly, regeneration and reuse of lime-based **sulfur oxides** sorbent in petroleum **coke**-fired circulating **fluidized**-bed boiler)
- IT Coke  
(petroleum, regeneration and reuse of lime-based **sulfur oxides** sorbent in petroleum **coke**-fired circulating **fluidized**-bed boiler)
- IT 7664-93-9P, Sulfuric acid, preparation

- (regeneration and reuse of lime-based **sulfur oxides** sorbent in petroleum **coke-fired** circulating **fluidized-bed** boiler)
- IT 7446-09-5P, **Sulfur dioxide**, formation (nonpreparative)  
(regeneration and reuse of lime-based **sulfur oxides** sorbent in petroleum **coke-fired** circulating **fluidized-bed** boiler)
- IT 7778-18-9, Calcium sulfate  
(regeneration and reuse of lime-based **sulfur oxides** sorbent in petroleum **coke-fired** circulating **fluidized-bed** boiler)
- IT 12624-32-7, **Sulfur oxide**  
(regeneration and reuse of lime-based **sulfur oxides** sorbent in petroleum **coke-fired** circulating **fluidized-bed** boiler)
- L39 ANSWER 13 OF 26 HCA COPYRIGHT 2004 ACS on STN
- 122:113286 A review of the global emissions, transport and effects of heavy metals in the environment. Friedman, J. R.; Ashton, W. B.; Rapoport, R. D. (Pac. Northwest Lab., Richland, WA, USA). Report, PNL-SA-22394; Order No. DE93016817, 34 pp. Avail. NTIS From: Energy Res. Abstr. 1993, 18(10), Abstr. No. 30559 (English) 1993.
- AB A review with 108 refs. The purpose of this report is to describe the current state of knowledge regarding the sources and quantities of heavy metal emissions, their transport and fate, their potential health and environmental effects, and strategies to control them. The approach is to review the literature on this topic and to consult with experts in the field. Ongoing research activities and research needs are discussed. Ests. of global anthropogenic and natural emissions indicate that anthropogenic emissions are responsible for most of the heavy metals released into the atm. and that industrial activities have had a significant impact on the global cycling of trace metals. The largest anthropogenic sources of trace metals are coal combustion and the nonferrous metal industry. Atm. deposition is an important pathway by which trace metals enter the environment. Atm. deposition varies according to the soly. of the element and the length of time it resides in the atm. Evidence suggests that deposition is influenced by other chems. in the atm., such as ozone and **sulfur dioxide**. Trace metals also enter the environment through leaching. Existing emissions-control technologies such as electrostatic precipitators, baghouses, and scrubbers are designed to remove other **particulates** from the flue gas of coal-fired power plants and are only partially effective at removing heavy metals. Emerging technologies such as flue gas **desulfurization**, lignite **coke**, and **fluidized** bed combustion could further reduce emissions.

CC 59-0 (Air Pollution and Industrial Hygiene)

L39 ANSWER 14 OF 26 HCA COPYRIGHT 2004 ACS on STN

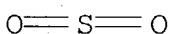
121:260312 Process and electric furnace for recovery of lead, especially from used batteries. Bied-Charreton, Benoit; Chabry, Pierre; Lecadet, Jacques; Pasquier, Patrice (Metaleurop S.A., Fr.). Can. Pat. Appl. CA 2106014 AA 19940312, 31 pp. (French). CODEN: CPXXEB. APPLICATION: CA 1993-2106014 19930913. PRIORITY: FR 1992-10849 19920911.

AB The procedure involves (1) weakly reducing melting of fines in the presence of a small amt. of C at 600-1100° so that Pb is sepd. from a Pb-rich slag and S is eliminated in the form of **SO<sub>2</sub>**, (2) redn. of the Pb-rich slag at 900-1500° by using an appropriate C amt. to sep. Pb, and (3) recovery of Pb from steps 1 and 2. S is eliminated almost completely in the form of a gas mixt. contg. 20-40% **SO<sub>2</sub>** and balance CO<sub>2</sub>. C is used in the form of **coke, petroleum coke, coke dust**, graphite, carbon black, charcoal, anthracite, or coal. Amt. of the C added is 2-4 wt.% in the 1st step and 5-30% in the 2nd step. Flux added in the 1st step consists of Fe oxide, CaO, and optionally SiO<sub>2</sub>. An elec. furnace with immersed electrodes is provided with a siphon for recovery of molten Pb.

IT **7446-09-5, Sulfur oxide (SO<sub>2</sub>)**,  
processes  
(in recovery of lead from used batteries)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



IC ICM C22B013-02

ICS C22B013-06; C22B007-00; H01M010-54

CC 54-2 (Extractive Metallurgy)

Section cross-reference(s): 52

IT **7446-09-5, Sulfur oxide (SO<sub>2</sub>)**,  
processes

(in recovery of lead from used batteries)

L39 ANSWER 15 OF 26 HCA COPYRIGHT 2004 ACS on STN

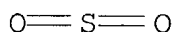
115:95659 Coking studies. Part 3; The use of regenerable iron-based sulfur-acceptor **particles** as bed material. Hall, E. Stanley; Bui, Viet V.; Tollefson, Eric L. (Dep. Chem. Pet. Eng., Univ. Calgary, Calgary, AB, T2N 1N4, Can.). AOSTRA Journal of Research, 6(4), 255-72 (English) 1990. CODEN: AJREEU. ISSN: 0822-2509.

AB Coking of high-S oil sand bitumens in the presence of Fe-based bed

material was at least as effective as using **fluid** oil-sand **coke** from the Syncrude process; the test was carried out in a small fixed-bed facility and a small **fluid coker**

. Liq. yields of <88% were obsd. with both bed materials under once-through coking conditions and short vapor residence times. Preliminary studies of the sulfiding, C burnout, and regeneration properties of the S-acceptor (Fe-rich) **particles** in fixed beds were encouraging. Use of air for combustion of coke with minimal release of **SO2** was demonstrated, although recovery of S as a concd. SO stream was less successful. Attempts to run the reaction in a fluidized bed were complicated by the presence of non-fluidizing lumps of agglomerated bed material that formed during the coking cycles.

IT 7446-09-5P, **Sulfur dioxide**, preparation  
 (formation and emission of, in **fluid coking**  
 of oil-sand bitumen in presence of iron-based absorbents)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



CC 51-14 (Fossil Fuels, Derivatives, and Related Products)  
 ST coking oil sand bitumen **desulfurization**; iron absorbent  
 bitumen coking **desulfurization**; sulfidation iron absorbent  
 bitumen coking; **sulfur dioxide** bitumen coking;  
**fluid coking** bitumen **desulfurization**;  
**fluidization** bitumen **coking**  
**desulfurization**  
 IT **Desulfurization**  
 (in coking of oil-sand bitumens, iron-based absorbents for)  
 IT **Fluidization**  
 (in **fluid coking** of oil-sand bitumens, effect  
 of iron-based absorbents on)  
 IT Absorbents  
 (iron-based, for **desulfurization**, in coking of oil-sand  
 bitumens)  
 IT **Petroleum** refining  
 (**coking**, of oil sand bitumens, in presence of  
 iron-based absorbents, for **desulfurization**)  
 IT Ashes (residues)  
 (fly, iron-rich, absorbents contg., for **desulfurization**  
 , in coking of oil-sand bitumens)  
 IT Bitumens  
 (oil sand, coking of, in presence of iron-based absorbents, for  
**desulfurization**)  
 IT 7439-89-6, Iron, uses and miscellaneous  
 (absorbents contg., for **desulfurization**, in

- fluid coking** of oil-sand bitumens)
- IT 7446-09-5P, **Sulfur dioxide**, preparation  
(formation and emission of, in **fluid coking**  
of oil-sand bitumen in presence of iron-based absorbents)
- L39 ANSWER 16 OF 26 HCA COPYRIGHT 2004 ACS on STN  
112:80561 Fluidized-bed brown coal - a new brown coal product with a  
promising future. Kreusing, Helmut; Klotz, Hartmut; Greif, Hans  
Georg (Cologne, 5000/41, Fed. Rep. Ger.). Braunkohle (Duesseldorf),  
41(12), 441-5 (German) 1989. CODEN: BRUKAO. ISSN: 0341-1060.
- AB A review with 2 refs. of the use of brown coal products (briquets,  
**coke, dust**) in **fluidized** bed firings,  
properties and uses of the fluidized bed brown coal, and operational  
experiences of the brown coal-fired circulating fluidized bed  
installations. Low emissions (**SO2** <200 mg/m<sup>3</sup>, NO<sub>x</sub> <200  
mg/m<sup>3</sup>, low CO) resulting from the special properties of the  
Rhineland brown coal is discussed. A prodn. plant for fluidized bed  
brown coal with a capacity of .apprx.500,000 tons/yr was put into  
operation in 1989, and is intended for supply to circulating  
fluidized-bed boiler plants with a steam output of 50-300 tons/h.
- CC 51-0 (Fossil Fuels, Derivatives, and Related Products)  
Section cross-reference(s): 59
- L39 ANSWER 17 OF 26 HCA COPYRIGHT 2004 ACS on STN  
100:9704 Circulating fluidized bed combustion - translation of  
developmental results into practical application. Plass, L.;  
Daradimos, G.; Beisswenger, H.; Koch, W.; Wargalla, G.; Schmitz, G.  
(Lurgi Chem. Huettentech. G.m.b.H., Frankfurt/Main, Fed. Rep. Ger.).  
VGB Kraftwerkstechnik, 63(10), 880-7 (German) 1983. CODEN: VGBKB5.  
ISSN: 0372-5715.
- AB Results of pilot-plant and com.-scale combustion in a circulating  
fluidized bed are given. Pilot-plant scale combustion yielded 99% C  
combustion, 130-300 ppm NO<sub>x</sub>, and 89-98% S capture (80-110 ppm  
**SO2**) from staged combustion of coal (max 4.8% S) and  
**petroleum coke** (5.1% S) with an air-fuel ratio of  
1.18-1.23:1 and a Ca-S ratio of 1.3-1.58:1. Combustion in a  
com.-scale plant gave similar results.
- IT 7446-09-5, uses and miscellaneous  
(emissions, from coal and petroleum combustion in circulating  
fluidized beds)
- RN 7446-09-5 HCA
- CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

- CC 51-18 (Fossil Fuels, Derivatives, and Related Products)  
Section cross-reference(s): 48, 59



- ST coal combustion circulating fluidized bed; firing furnace coal circulating fluidized; **desulfurization** coal circulating fluidized combustion; **coke petroleum fluidized** combustion; nitrogen oxide coal fluidized combustion
- IT Fluidized beds and systems  
(circulating, combustion in, of coal and **petroleum coke**)
- IT **Desulfurization**  
(in coal and petroleum combustion in circulating fluidized beds)
- IT Combustion  
(fluidized-bed, circulating, of coal and **petroleum coke**)
- IT **Coke**  
(**petroleum**, combustion of, in circulating fluidized bed)
- IT **7446-09-5**, uses and miscellaneous 11104-93-1, uses and miscellaneous  
(emissions, from coal and petroleum combustion in circulating fluidized beds)

L39 ANSWER 18 OF 26 HCA COPYRIGHT 2004 ACS on STN

99:215579 Fluidized combustion. (Mitsubishi Heavy Industries, Ltd., Japan; Kobe Steel, Ltd.). Jpn. Tokkyo Koho JP 58021162 B4 19830427 Showa, 3 pp. (Japanese). CODEN: JAXXAD. APPLICATION: JP 1976-149864 19761215.

AB A fossil fuel is burned in a fluidized bed at 800-1100° and excess-air ratio  $\leq 1.15$  in the presence of converter slag or steelmaking slag as the fluidized medium, to reduce **SOx** and NOx emissions. Thus, coke powder was burned at 900-980° in a fluidized bed contg. converter slag.

IC F23C011-02; F23G005-00

ICA B01D053-34

CC 51-18 (Fossil Fuels, Derivatives, and Related Products)  
Section cross-reference(s): 55, 59

ST slag **fluidization coke** combustion; emission coke combustion slag; air pollution fluidization combustion

IT Slags  
(**fluidized** beds of, **coke** combustion in, for emission control)

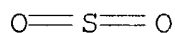
IT Firing of furnaces  
(with **coke powder**, in **fluidized** beds of slag)

L39 ANSWER 19 OF 26 HCA COPYRIGHT 2004 ACS on STN

96:106553 The Wellman-Lord **sulfur dioxide** recovery process. Leckner, Philip; Pearson, R. O.; Wood, R. T. (Davy McKee Corp., Lakeland, FL, 33803, USA). Chemical Engineering Progress,

78(2), 65-70 (English) 1982. CODEN: CEPRA8. ISSN: 0009-2495.

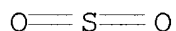
- AB A system for **desulfurizing** a flue gas contg. **SO2** 3490, **SO3** 140 ppm, and **particulates** (mainly unburned coke) 0.272 kg/s is discussed. The **SO2** emissions of the plant are <390 ppm, **SO3** <12 ppm, and **particulates** <0.022 kg/s. The fuel burned is a **petroleum fluid coke** contg. 8% S. The flue gas is scrubbed with water, passed through wet electrostatic precipitators to remove **SO3** and **particulates**, and treated in an absorber with aq. Na2SO3 to absorb **SO2**. Any Na2SO4 formed by oxidn. of NaHSO3 is removed and the NaHSO3 soln. is evapd. to form **SO2** gas and Na2SO3 crystals. The **SO2** is converted to H2SO4 by a conventional process. The H2SO4 plant is designed to process the **SO2** from the above process and **SO2** obtained when burning spent alkylation acid for regenerating H2SO4.
- IT 7446-09-5P, preparation  
(recovery of, in flue-gas **desulfurization** for sulfuric acid manuf.)
- RN 7446-09-5 HCA
- CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



- CC 49-2 (Industrial Inorganic Chemicals)  
Section cross-reference(s): 59
- ST **sulfur dioxide** removal flue gas; sulfuric acid regeneration
- IT Flue gases  
(**sulfur dioxide** removal from, by sodium sulfite with recovery for sulfuric acid manuf.)
- IT 7757-83-7  
(absorption by, of **sulfur dioxide** from flue gases)
- IT 7664-93-9P, preparation  
(manuf. of, in flue-gas **desulfurization** and alkylation waste acid incineration)
- IT 7446-09-5P, preparation  
(recovery of, in flue-gas **desulfurization** for sulfuric acid manuf.)
- L39 ANSWER 20 OF 26 HCA COPYRIGHT 2004 ACS on STN  
95:222245 Recovery of sulfur from gas containing **sulfur dioxide**. (Sumitomo Heavy Industries, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 56092108 19810725 Showa, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1979-168357 19791226.
- AB A mixt. of **SO2**-contg. gas and air (e.g. from a waste gas

**desulfurization** app. or sulfide ore-roasting) is passed upwardly through a moving bed of a 1:(0.01-0.5) mixt. of **granular** coal or coke as reductant and  $\geq 1$  of Ca, Mg oxides, hydroxides, carbonates, and  $\text{Fe}_2\text{O}_3$  to reduce **SO<sub>2</sub>**, then a bed of  $\geq 1$  of  $\text{Al}_2\text{O}_3$ ,  $\text{SiO}_2$ , and  $\text{TiO}_2$  to decomp. COS, and cooled to condense S. Thus, gas at 400° contg. **SO<sub>2</sub>** 19.7, CO<sub>2</sub> 12.8, O<sub>2</sub> 4, H<sub>2</sub>O 3.0 vol.%, and N balance was passed at 26.84 L/min and 840° through a bed of coke contg. 15% CaO 4-6 mm and moving at 950 g/h in a 10.2 cm diam. + 1.8 m tube. The effluent contained H<sub>2</sub>S 0.42, COS 0.59, and **SO<sub>2</sub>** 0.53% (S and H<sub>2</sub>O-free basis) (**SO<sub>2</sub>** conversion 97.2 and S yield 91.9%), compared to 1.05, 0.67, and 0.57 (97.0 and 88.0) without CaO. When further passed through a 1.66 L  $\text{TiO}_2$  bed (6 mm diam.) at 700° in a 50 mm diam. tube, the contents were 0.54, 0.12, and 0.35g, resp. (S yield 94.7%).

IT 7446-09-5, reactions  
 (redn. of, in **coke**-contg. **fluidized** bed,  
 calcium oxide in)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



IC C01B017-04  
 CC 49-1 (Industrial Inorganic Chemicals)  
 ST **sulfur dioxide** redn coke  
 IT Coke  
 (in sulfur recovery from **sulfur dioxide**  
 -contg. waste gas)  
 IT 1305-78-8, uses and miscellaneous  
 (in sulfur recovery from **sulfur dioxide**  
 -contg. waste gas)  
 IT 7704-34-9P, preparation  
 (recovery of, from **sulfur dioxide**-contg.  
 waste gases, **coke fluidized** bed and calcium  
 oxide in)  
 IT 7446-09-5, reactions  
 (redn. of, in **coke**-contg. **fluidized** bed,  
 calcium oxide in)

L39 ANSWER 21 OF 26 HCA COPYRIGHT 2004 ACS on STN  
 82:173138 Strontium oxide. Coatney, RichArd L.; Housh, Lloyd M.; Van  
 Dreser, Merton L. (Kaiser Aluminum Chemical Corp.). Ger. Offen. DE  
 2419822 19750206, 19 pp. (German). CODEN: GWXXBX. APPLICATION:  
 DE 1974-2419822 19740424.  
 AB SrO was manufd. by thermal decompn. of  $\text{SrCO}_3$  with addn. of carbon to  
 prevent melting.  $\text{SrCO}_3$  of particle size 60% <200 mesh, manufd. by

reaction of  $\text{SrSO}_4$  with  $\text{Na}_2\text{CO}_3$  and contg.  $\text{SrO}$  63,  $\text{CO}_2$  28,  $\text{BaO}$  1.4,  $\text{CaO}$  2.2,  $\text{SiO}_2$  1.5,  $\text{Al}_2\text{O}_3$  0.3,  $\text{Fe}_2\text{O}_3$  0.2,  $\text{Na}_2\text{O}$  1.2, and  $\text{SO}_3$  2.2%, was slurried, ground, mixed with 10% calcined, delayed **petroleum coke** of grain size 50% <200 mesh and the mixt. calcined in a rotary kiln at max.  $1350^\circ$  to give unmelted  $\text{SrO}$ .

IC C01F

CC 49-3 (Industrial Inorganic Chemicals)

IT **Coke**

(**petroleum**, for strontium carbonate melting prevention in calcination for oxide)

IT 1633-05-2

(calcination of, in presence of **petroleum coke** for oxide)

IT 1314-11-0P

(from carbonate, calcination in presence of **petroleum coke** for)

L39 ANSWER 22 OF 26 HCA COPYRIGHT 2004 ACS on STN

78:86582 Sintering of sulfate-hydroxide charge at Kirovabad aluminum plant. Chizhikov, D. M.; Lainer, Yu. A.; Lainer, A. I.; Zakharova, V. I. (USSR). Tsvetnye Metally (Moscow, Russian Federation) (7), 35-8 (Russian) 1972. CODEN: TVMTAX. ISSN: 0372-2929.

AB Expts. were conducted on the replacement of rotary furnaces with a sintering belt. A mixt. of  $(\text{Na},\text{K})\text{SO}_4$  and  $\text{Al}_2\text{O}_3$  was wetted and **granulated** with 20-5% **petroleum coke** to give strong dried granules contg. 1-2%  $\text{H}_2\text{O}$  for sintering in a reducing atm. Optimum conditions using a draft of 450-500 mm and 0.3 kg steam/kg charge, gave 95% redn. of the sulfates and up to 90% extn. of Al.

CC 49-1 (Industrial Inorganic Chemicals)

Section cross-reference(s): 54

L39 ANSWER 23 OF 26 HCA COPYRIGHT 2004 ACS on STN

67:55713 Manufacture of antimony trioxide. (M and T Chemicals Inc.). Neth. Appl. NL 6612435 19670303, 23 pp. (Dutch). CODEN: NAXXAN. PRIORITY: US 19650902.

AB The method employs the vapor phase removal of Sb as  $\text{Sb}_2\text{S}_3$  from a pelleted agglomerate, then vapor phase oxidn. to  $\text{Sb}_2\text{O}_3$ , which is condensable at  $400-800^\circ$ , thus sepg. it from  $\text{SO}_2$  and  $\text{As}_2\text{O}_3$  vapors. Stibnite ore contg. up to 65% Sb and also the cheaper and more abundant concn. ranging down to 10% Sb content can be used. The pelletizing procedure is conventional, using commonly specified binders, and is esp. important for continuous rotary kiln practice. Coaddns. during pelletization can be elemental S where there is high oxide content, some form of C or C-contg. material to reduce high  $\text{Fe}_2\text{O}_3$ , or, to prevent fluxing at temps. reaching  $1250^\circ$ , some refractory powder. Modification of the process may be made to

obtain Sb<sub>2</sub>O<sub>3</sub> with high covering power as for paints or enamels, or for greater transparency as for fireproofing of fabrics or synthetics, or both opaque and fireproofing. This depends on particle size, usually between 0.9-3.2  $\mu$  which is largely governed by speed and temp. of the Sb<sub>2</sub>O<sub>3</sub> vapor condensation. A Bolivian sulfide, 74.3 parts, contg. Sb 46.2, S 24, and Fe 2.7% was **pelleted** with **petroleum coke** 13.8, bentonite 10.2, and Ca ligninsulfonate 1.7 parts while wet. The pellets are volatilized at 1093° in **SO<sub>2</sub>**, the gas at 1000° is mixed with slight excess of air, and the Sb<sub>2</sub>O<sub>3</sub> is condensed at 500°. The product is of high purity. In a similar prepn., an oxide-sulfide ore gave a 98% recovery when the calcination temp. was raised to 1050° and 15 wt. % S was added.

IC C01B

CC 49 (Industrial Inorganic Chemicals)

L39 ANSWER 24 OF 26 HCA COPYRIGHT 2004 ACS on STN

54:106065 Original Reference No. 54:20185c-d Removal of coke from processing equipment. Wolff, Wm. F.; Hill, Philip (Standard Oil Co.). US 2938852 19600531 (Unavailable). APPLICATION: US .

AB The coke formed during cracking of, e.g., a reduced crude oil is easily removed from the coking zone if it is deposited on a H<sub>2</sub>O-sol. salt, such as NaCl, Na<sub>2</sub>SO<sub>4</sub>, Na<sub>2</sub>CO<sub>3</sub>, K<sub>2</sub>SO<sub>4</sub>, K<sub>2</sub>CO<sub>3</sub>, KCl, MgSO<sub>4</sub>, or Al<sub>2</sub>(**SO<sub>4</sub>**)<sub>3</sub>, which remains solid at the coking temp. The coke is formed in the voids between salt particles of >0.25 in. size in a fixed bed at 700-1200°F., and a space velocity of 5-500 vols. of oil/hr./vol. free space. The salt is dissolved in H<sub>2</sub>O on completion of the coking cycle, and the fine coke is removed. A demetalized stock suitable for catalytic cracking is obtained in this process.

CC 22 (Petroleum, Lubricants, and Asphalt)

IT **Petroleum** refining

(**coking**, in salt-particle bed)

IT **Coking**

(of **petroleum** residues, in bed of salt particles)

IT Salts

(**petroleum** residue **coking** in **particle** bed of)

IT 7647-14-5, Sodium chloride

(rock salt, **petroleum** residue **coking** in **particle** bed of)

L39 ANSWER 25 OF 26 HCA COPYRIGHT 2004 ACS on STN

52:103631 Original Reference No. 52:18166f-h Carbonaceous molding material for foundry operations. Meyers, Gustave R.; Gentry, Everett G. (Esso Research and Engineering Co.). US 2830913 19580415 (Unavailable). APPLICATION: US .

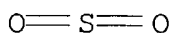
- AB **Petroleum coke** (25-100%) contg. <7% S, remainder sand, with or without binder, is used for making cores and molds for casting of metals and alloys, e.g., cast Fe, steel, bronze, or Al. Because of the low thermal expansion and nonwettability by metals of this compn., higher dimensional accuracy and smoother finish are obtained. **Coke** prepd. by **fluidized-bed coking** of **petroleum** fractions is calcined at 2400-2800°F. to decrease the amt. of volatile matter to <1% and to increase the d. to >1.7 g./cc. The raw or calcined coke is then **desulfurized** by oxidizing at 600-1500°F. for a time sufficient to consume 3% of it, followed by heating in the presence of a **desulfurizing** gas, e.g., H at >1100°F., **SO<sub>2</sub>** at >1800°F., or **NH<sub>3</sub>**. Alternatively, the coke can be heated to 2400-2800°F., at which temp. the S compds. break down and are driven off.
- CC 9 (Metallurgy and Metallography)
- IT Molds (forms)  
(from **petroleum coke** and sand)
- IT **Coke**  
(**petroleum**, molds from sand and)

L39 ANSWER 26 OF 26 HCA COPYRIGHT 2004 ACS on STN  
50:54471 Original Reference No. 50:10396i,10397a,10398a

**Petroleum-coke desulfurization.** Ford,  
Francis P.; Nelson, Joseph F. (Esso Research and Engineering Co.).  
US 2739105 19560320 (Unavailable). APPLICATION: US .

- AB **Fluidized coke particles** are produced by bringing a heavy petroleum charging stock into contact with a **fluidized coke** bed, whereby the oil is converted to vapors and carbonaceous solids. The latter are deposited on the coke **particles**. A portion of the **particles** is heated and recycled, the excess being withdrawn from the system. The **particles**, which contain 4-12% by wt. S, are **desulfurized** and their densities increased by bringing them into contact with a gas contg. 5-100 mole % **SO<sub>2</sub>**, remainder N, at 1093-593° for 15 min. to 6 hrs. For example, a coke contg. 6.5-7.6% S, and having a true d. of about 1.5, was treated for 30 min. with 100% **SO<sub>2</sub>** at 1316°. After treatment, the coke contained 2.97% S and had a true d. of 1.94. The coke yield was 56%.

- IT 7446-09-5, Sulfur dioxide  
(**petroleum-coke-particle**  
**desulfurization** and d. increase by high-temp.)
- RN 7446-09-5 HCA
- CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



- CC 22 (Petroleum, Lubricants, and Asphalt)  
IT **Petroleum** refining  
(**coking** heavy fractions in **fluidized**  
**coke** bed and **desulfurization** and increasing d.  
of **coke particles** by **SO2**)  
IT Hydrocarbon oils  
(gas oil, by **coking** of **petroleum** heavy  
fractions and distn. of vapors)  
IT **Coke**  
(**petroleum**, manuf. in fluidized beds and  
**desulfurization** and increasing d. of **particles**  
by **SO2**)  
IT 7446-09-5, Sulfur dioxide  
(**petroleum-coke-particle**  
**desulfurization** and d. increase by high-temp.)  
IT 7704-34-9, Sulfur  
(removal of, from **petroleum coke**  
**particles** by **SO2**)

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L40 ANSWER 1 OF 13 HCA COPYRIGHT 2004 ACS on STN

139:135748 Characteristics of sulfur removal of high-sulfur  
**petroleum coke**. Bi, Sheng; Xu, Chunming; Gao,  
Jinsen (The State Key Laboratory of Heavy Oil Processing, Petroleum  
University, Beijing, 102249, Peop. Rep. China). Huagong Xuebao  
(Chinese Edition), 54(6), 819-823 (Chinese) 2003. CODEN: HUKHAI.  
ISSN: 0438-1157. Publisher: Huaxue Gongye Chubanshe, Huagong Xuebao  
Bianjibu.

AB The characteristics of **desulfurization** of high-sulfur  
**petroleum coke** are investigated with a  
pulse-differential fix bed reactor. The combustion tests are  
carried out with one representative coke with **particle**  
size of 60-70  $\mu$ m between 830° and 950°. In the expt.,  
sulfur is captured by calcium oxide addn., and then yields stable  
calcium sulfide. Through the tests, five important factors  
affecting **desulfurization** are found: temp., Ca/S molar  
ratio, oxygen pressure, velocity of gas and intensity of **SO2**  
emission. Burning in air, the optimum Ca/S molar ratio is 2, and  
the optimum temp. ranges from 850° to 890°. Intensity  
of **SO2** emission is related with temp. and velocity of gas.  
Velocity of gas and intensity of **SO2** emission have neg.  
effect to **desulfurization**. Another important finding from  
the results on high-sulfur **petroleum coke** is  
that under the most optimum conditions, the **desulfurization**  
ratio in air is higher than that in pure oxygen.

IT 7446-09-5, Sulfur dioxide, processes  
 (characteristics of sulfur removal of high-sulfur  
 petroleum coke)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 51-10 (Fossil Fuels, Derivatives, and Related Products)  
 ST sulfur removal petroleum coke combustion  
 IT Combustion  
 Flue gases

(characteristics of sulfur removal of high-sulfur  
 petroleum coke)

IT Petroleum coke  
 (characteristics of sulfur removal of high-sulfur  
 petroleum coke)

IT 7446-09-5, Sulfur dioxide, processes  
 (characteristics of sulfur removal of high-sulfur  
 petroleum coke)

IT 1305-78-8, Calcium oxide, uses  
 (characteristics of sulfur removal of high-sulfur  
 petroleum coke)

L40 ANSWER 2 OF 13 HCA COPYRIGHT 2004 ACS on STN

138:141468 Novel electrostatic precipitation technologies in Japan -  
 colder side ESP and new wet-type ESP application for boiler  
 facilities-. Fujishima, H.; Maekawa, N.; Ohnishi, S.; Fujitani, H.  
 (Kobe shipyard and Machinery Works 1-1, Mitsubishi Heavy Industries,  
 Ltd., Kobe, 652-8585, Japan). Proceedings - U.S. EPA-DOE-EPRI  
 Combined Power Plant Air Pollution Control Symposium: The Mega  
 Symposium and the A&WMA Specialty Conference on Mercury Emissions:  
 Fate, Effects, and Control, Chicago, IL, United States, Aug. 21-23,  
 2001, Volume 3, 9/1-9/17. Air & Waste Management Association:  
 Pittsburgh, Pa. (English) 2001. CODEN: 69DHKF.

AB Approx. 50 yr have passed since Electrostatic precipitator (ESP) was  
 introduced for industrial use in Japan. During this period, with  
 the high-level economic growth of Japan and a great expansion of a  
 variety of industries along with stringent environmental regulation,  
 ESP installed as main equipment for flue gas treatment has spread  
 through Japan. Meanwhile, the research & development of ESP  
 technol. have made remarkable progress with the use of a no. of new  
 or improved techniques. This paper introduces two novel ESP  
 technologies, recently developed in Japan, for boiler firing  
 imported coals and various kinds of oil, such as heavy oil,  
 petroleum residue and cokes.

IT 7446-09-5, Sulfur dioxide, processes

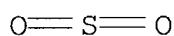


**7446-11-9, Sulfur trioxide, processes**

(novel electrostatic pptn. technologies in Japan: colder side ESP  
and new wet-type ESP application for boiler facilities)

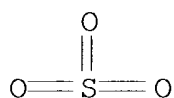
RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



RN 7446-11-9 HCA

CN Sulfur trioxide (8CI, 9CI) (CA INDEX NAME)



CC 59-4 (Air Pollution and Industrial Hygiene)

Section cross-reference(s): 51

IT Wet scrubbing

(flue gas **desulfurization** by; novel electrostatic pptn.  
technologies in Japan: colder side ESP and new wet-type ESP  
application for boiler facilities)

IT Flue **dust**

Flue gas **desulfurization**

Flue gases

(novel electrostatic pptn. technologies in Japan: colder side ESP  
and new wet-type ESP application for boiler facilities)

IT **7446-09-5, Sulfur dioxide, processes**

**7446-11-9, Sulfur trioxide, processes**

7647-01-0, Hydrochloric acid, processes 7664-93-9, Sulfuric acid,  
processes

(novel electrostatic pptn. technologies in Japan: colder side ESP  
and new wet-type ESP application for boiler facilities)

L40 ANSWER 3 OF 13 HCA COPYRIGHT 2004 ACS on STN

135:7617 Project developers consider new solid fuels, new technologies.  
Swanekamp, Robert (USA). Power, 145(2), 35, 38-40, 42 (English)  
2001. CODEN: POWEAD. ISSN: 0032-5929. Publisher: McGraw-Hill  
Companies, Inc..

AB After dominating new power-plant design and construction for the  
past two decades, developments in new combustion and flue gas  
treatment technologies, as well as environmental-based market forces  
(esp. constraints in natural gas prodn. and distribution) and recent  
political developments, have sparked a resurgence in use of solid  
fossil fuels for power generation. Some suitable solid fuels that  
are projected to gain new interest and momentum are **Powder**  
River Basin coals (from the western U.S. states of Wyoming and

Montana), **petroleum coke** and other residues, coal waste, and biomass, the latter two of which can be incorporated into more traditional solid waste combustion. Suitable novel technologies expected to make an impact are electrostatic precipitators, flue gas **desulfurization**, low-NOx burner designs, outdoor storage of solid fuels, and solid fuel (biomass) gasification.

IT **7446-09-5, Sulfur dioxide**, processes  
(formation of; resurgence in use of coal, solid fossil fuels, biomass, and solid fuel wastes in power generation)  
RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

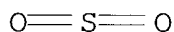
CC 51-23 (Fossil Fuels, Derivatives, and Related Products)  
Section cross-reference(s): 52, 59, 60  
ST coal combustion power generation design; **petroleum coke** power generation design; biomass gasification power generation design  
IT **Petroleum coke**  
(firing of; resurgence in use of coal, solid fossil fuels, biomass, and solid fuel wastes in power generation)  
IT Electrostatic precipitation apparatus  
Flue gas **desulfurization**  
(resurgence in use of coal, solid fossil fuels, biomass, and solid fuel wastes in power generation)  
IT **7446-09-5, Sulfur dioxide**, processes  
11104-93-1, Nitrogen oxide (NOx), processes  
(formation of; resurgence in use of coal, solid fossil fuels, biomass, and solid fuel wastes in power generation)

L40 ANSWER 4 OF 13 HCA COPYRIGHT 2004 ACS on STN  
132:281185 Activation of **petroleum coke** by alkali metal compounds and **SO2** adsorption characteristics: moisture effect. Lee, Si Hyun; Lim, Young Jun; Lee, Kyu Chol (Energy & Environmental Research Department, Korea Institute of Energy Research, Taejon, 305-343, S. Korea). Hwahak Konghak, 37(5), 782-788 (Korean) 1999. CODEN: HHKHAT. ISSN: 0304-128X. Publisher: Korean Institute of Chemical Engineers.

AB Activation of **petroleum cokes** by alkali metal compds. and **SO2** adsorption characteristics were investigated. Near complete removal(>95%) of sulfur and ash, hydrogen evolution of purity more than 95%, and redns. of **particle** size were major features of alkali activation. Adsorption capacities of activated carbons at low temp.(30°) were not increased with moisture contents, and this is opposite to

results reported with the activated carbon fiber. It was found that the moisture contents above satn. level cause condensation on pore surfaces of activated carbons due to the smaller no. of free sites and lower adsorption/desorption rates than the activated carbon fiber, and also found that the optimum adsorption temps. must be selected with moisture contents. Typical results showed that 100° for the 10% moisture, and 30° for the 4% moisture were optimum conditions, resp. Alkali activated carbon from **petroleum cokes** showed larger **SO2** adsorption capacity than the conventional activated carbon due to its wide ranges of pore size and its hydrophilic surface functional groups. **SO2** adsorption capacity was about 200 mg **SO2/g AC/6 h** without pretreatment such as oxidn. and thermal treatment.

IT 7446-09-5, Sulfur dioxide, processes  
 (activation of **petroleum coke** by alkali metal  
 compds. and **SO2** adsorption characteristics)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



CC 49-1 (Industrial Inorganic Chemicals)  
 Section cross-reference(s): 54, 59, 66  
 ST **petroleum coke** activation alkali metal compd;  
**sulfur dioxide** adsorption **petroleum**  
**coke**  
 IT Adsorption  
**Desulfurization**  
**Particle** size distribution  
 (activation of **petroleum coke** by alkali metal  
 compds. and **SO2** adsorption characteristics)  
 IT **Petroleum coke**  
 (activation of **petroleum coke** by alkali metal  
 compds. and **SO2** adsorption characteristics)  
 IT Alkali metal compounds  
 (activation of **petroleum coke** by alkali metal  
 compds. and **SO2** adsorption characteristics)  
 IT 7440-44-0, Activated carbon, processes  
 (activated; activation of **petroleum coke** by  
 alkali metal compds. and **SO2** adsorption  
 characteristics)  
 IT 7446-09-5, Sulfur dioxide, processes  
 (activation of **petroleum coke** by alkali metal  
 compds. and **SO2** adsorption characteristics)  
 IT 1310-58-3, Potassium hydroxide, uses 1310-73-2, Sodium hydroxide,  
 uses

(activation of **petroleum coke** by alkali metal compds. and **SO2** adsorption characteristics)

L40 ANSWER 5 OF 13 HCA COPYRIGHT 2004 ACS on STN

131:7377 Changes in the quality of coal combustion by-products produced by Kentucky power plants, 1978 to 1997: consequences of Clean Air Act directives. Hower, James C.; Robl, Thomas L.; Thomas, Gerald A. (Center for Applied Energy Research, The University of Kentucky, Lexington, KY, 40511-8410, USA). Fuel, 78(6), 701-712 (English) 1999. CODEN: FUELAC. ISSN: 0016-2361. Publisher: Elsevier Science Ltd..

AB The original US Clean Air Act (CAA), implemented by the Environmental Protection Agency in 1971, and the amendments to the act in 1977 and 1990 have required a considerable evolution of the quality of coal burned by utilities and in the type pollution control equipment needed to reduce **SO2** and NOx emissions. Any change in coal quality or emission's control implies a change in the amt., type, and quality of coal combustion byproducts (CCB). CCB is a collective term for fly ash, bottom ash and boiler slag, and flue-gas **desulfurization** (FGD) or fluidized-bed combustion produced in coal burning. Studies by the University of Kentucky in 1978, 1992, and 1997, the latter two conducted by the Center for Applied Energy Research, have focussed on the amt., quality and end use of CCBs from Kentucky power plants, with particular emphasis on fly ash. The evolution of clean air stds. has impacted the quality and vol. of CCBs in a variety of ways: (1) switching from high sulfur to lower sulfur coal generates lower quantities of spinel phases and greater amts. of alumino-silicate glasses; (2) switching to **Powder** River Basin subbituminous coals produces Class C fly ash, compared to Class F fly ash from the combustion of the typical eastern bituminous coals; (3) the wider use of beneficiated coals reduces the amt. of fly ash and bottom ash produced; (4) use of a wider rank range into the coal blend increases the potential of unburned carbon caused by inefficient combustion of non-design coals; (5) the inclusion of non-coal fuels, such as **petroleum coke** and with tire-derived fuel, in the coal blend; (6) redn. of NOx emissions has generally meant an initial increase in the amt. of carbon in the fly ash; (7) addn. of FGD means an added CCB stream, either a calcium sulfite which is generally mixed with fly ash and landfilled, or a calcium sulfate, which is sold for wallboard manuf. The modification of the petrol. and chem. of the fly ash impacts the potential for utilization.

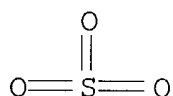
CC 51-18 (Fossil Fuels, Derivatives, and Related Products)  
Section cross-reference(s): 59

L40 ANSWER 6 OF 13 HCA COPYRIGHT 2004 ACS on STN

125:175964 Integrated flue gas cleaning for the next regulatory

generation. Vincent, Hugues; Jones, Gerwyn (Belco Technologies Corporation, Parsippany, NJ, USA). FACT (American Society of Mechanical Engineers), 20(Proceedings of the 1995 International Joint Power Generation Conference, 1995, Vol. 1), 11-17 (English) 1995. CODEN: FACTEQ. ISSN: 1066-503X. Publisher: American Society of Mechanical Engineers.

- AB Before the end of this decade, utilities and other major power producers burning solid/liq. fuels can expect promulgation of further regulations mandated by the 1990 Clean Air Act Amendments. In particular, Title III, Air Toxics, provision could profoundly change the manner in which power producers will need to evaluate compliance technol. options. Integrated gas cleaning concepts will be necessary to achieve compliance, maximize existing gas cleaning assets, and avoid pollution transfer. Several integrated gas cleaning concepts for multi-pollutant control for high- and low-S coal and oil burning power plants are described.
- IT **7446-11-9, Sulfur trioxide, processes**  
(EDV integrated technol. to clean utility and industrial boiler flue gases for regulatory compliance)
- RN 7446-11-9 HCA
- CN Sulfur trioxide (8CI, 9CI) (CA INDEX NAME)



- CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 47, 48, 60
- ST fossil fuel fired power generation emission; flue gas cleaning  
fossil fuel power; hazardous waste incinerator flue gas cleaning;  
**petroleum coke** boiler flue gas cleaning;  
wastewater sludge incinerator flue gas cleaning
- IT **Desulfurization**  
(EDV integrated technol. to clean utility and industrial boiler flue gases for regulatory compliance)
- IT Boilers  
(**petroleum coke**-fired; EDV integrated  
technol. to clean utility and industrial boiler flue gases for  
regulatory compliance)
- IT **Particles**  
(airborne, EDV integrated technol. to clean utility and  
industrial boiler flue gases for regulatory compliance)
- IT 7439-92-1, Lead, processes 7439-97-6, Mercury, processes  
7440-02-0, Nickel, processes 7440-38-2, Arsenic, processes  
7440-43-9, Cadmium, processes 7440-44-0, Carbon, processes  
7440-47-3, Chromium, processes 7440-50-8, Copper, processes  
7440-62-2, Vanadium, processes 7440-66-6, Zinc, processes

**7446-11-9, Sulfur trioxide, processes**

(EDV integrated technol. to clean utility and industrial boiler flue gases for regulatory compliance)

L40 ANSWER 7 OF 13 HCA COPYRIGHT 2004 ACS on STN

123:294866 Manufacture of mineralized portland cement clinkers in a kiln system in which the raw mixt. is preheated, calcined, burned, and cooled. Borgholm, Hans Erik; Herfort, Duncan; Mogensen, Ole (F. L. Smidth and Co., A/S, Den.; Aalborg Portland A/S). PCT Int. Appl. WO 9523773 A1 19950908, 16 pp. DESIGNATED STATES: W: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, DE, DK, ES, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1995-DK75 19950221. PRIORITY: DK 1994-248 19940303; DK 1994-362 19940329.

AB The mineralizer is added to the feedstock stream after the feedstock has been fed to the process but before the feedstock has passed through the burning zone. More specifically, portland cement clinkers having S content (calcd. as **SO<sub>3</sub>**)  $\geq 1.5$  wt.% and F content (calcd. as F)  $\geq 0.15$  wt.% is manufd. by controlling the compn. of the feedstock such that the S content is  $\leq 1.2$  wt.% and the F content  $\leq 0.14$  wt.% (both calcd. on loss on ignition-free basis). The mineralizer is selected from sulfurous materials or minerals and F-contg. products. This process utilizes the input of the mineralizer as a controllable parameter during the manuf. of mineralized clinkers, and reduces or eliminates, e.g., deposits and blockages in the preheater cyclones and the riser ducts between the cyclones.

IC ICM C04B007-42

ICA C04B007-04

CC 58-1 (Cement, Concrete, and Related Building Materials)

IT Flue gases

(gypsum from **desulfurization** of; sulfurous and fluoride mineralizers for mineralized portland cement clinker manuf.)

IT Waste solids

(**dust**, kiln, sulfurous and fluoride mineralizers for mineralized portland cement clinker manuf.)

IT **Coke**

(**petroleum**, sulfurous and fluoride mineralizers for mineralized portland cement clinker manuf.)

IT 13397-24-5, Gypsum, uses

(natural and from flue gas **desulfurization**; sulfurous and fluoride mineralizers for mineralized portland cement clinker manuf.)

L40 ANSWER 8 OF 13 HCA COPYRIGHT 2004 ACS on STN

107:133390 Effect of **granulation** with coke on the kinetics of reduction of calcium sulfate. Kostyl'kov, I. G.; Rogachev, O. V.; Zhukov, I. A. (USSR). Zhurnal Prikladnoi Khimii (Sankt-Peterburg, Russian Federation), 60(7), 1623-5 (Russian) 1987. CODEN: ZPKHAB. ISSN: 0044-4618.

AB **Petroleum coke**-CaSO<sub>4</sub> 0.063:1 8 mm **granules** were kilned at 1050-1200° in a N<sub>2</sub> stream. S evolved as SO<sub>2</sub> according to reactions CaSO<sub>4</sub> .dblarw. CaO + SO<sub>2</sub> + 1/2O<sub>2</sub>, C + 1/2O<sub>2</sub> .dblarw. CO. CO<sub>2</sub> accumulation in the system autocatalytically hastened gasification according to the reaction C + CO<sub>2</sub> .dblarw. 2CO. This, in turn hastened CO<sub>2</sub> evolution. The initial and final phases of the process (below and above a 0.6-0.75 conversion) were described by equations  $-\lg(1-\alpha) = (0.000967 + t - 0.975) + [\tau - (5.3-0.004 + t)]$  and  $\alpha/1-\alpha = 3.5 \lg \tau - 18.4 + 0.016t$ , resp., where  $\alpha$  is the degree of conversion,  $\tau$  is the time of conversion in min, and  $t$  is temp. in °C. The process reached max. rate within 3 min. Compaction of the **granules** during kilning and accumulation of a film of reaction products enveloping the C **particles** terminated the process within 8 min. Raising the temp. from 1050 to 1200 dramatically increased the max. rate of the process without increasing the yield of SO<sub>2</sub>. The process was developed for utilization of the phosphogypsum byproduct of ammophos manuf.

IT **7446-09-5P, Sulfur dioxide**, preparation  
(formation of, in reductive **desulfurization** of calcium sulfate by coke, kinetics of)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 19-6 (Fertilizers, Soils, and Plant Nutrition)  
Section cross-reference(s): 49

ST coke sulfate redn kinetics; reductive **desulfurization**  
kinetics gypsum

IT **Coke**  
(**petroleum**, reductive **desulfurization** of calcium sulfate by, kinetics of)

IT Kinetics of **desulfurization**  
(reductive, of calcium sulfate, by coke)

IT **7446-09-5P, Sulfur dioxide**, preparation  
(formation of, in reductive **desulfurization** of calcium sulfate by coke, kinetics of)

IT 7778-18-9, Calcium sulfate  
(reductive **desulfurization** of, by coke, kinetics of)

L40 ANSWER 9 OF 13 HCA COPYRIGHT 2004 ACS on STN

105:175769 Apparatus for preparing an uncontaminated fuel in oval form. Cabello Huertas, Rafael; Rodriguez del Castillo, Gerardo (Spain). Span. ES 528019 A1 19851001, 16 pp. (Spanish). CODEN: SPXXAD. APPLICATION: ES 1983-528019 19831213.

AB A C-based solid fossil fuel is transported to an unloading dock with a ramp incorporating a grating so that the smaller pieces fall directly through the grating onto a hopper; the large **particles** are transported by a belt having a second hopper which spills onto a toothed crushing unit. An electromagnet may be included to sep. ferromagnetic impurities. The crushed pieces and those not requiring crushing are stored in a mixt. with **petroleum coke** and a decontaminating agent (e.g., limestone or dolomite to prevent release of **SO2** during combustion). The fuel can be used in the form of oval briquets.

IC ICM C10L010-02

CC 51-17 (Fossil Fuels, Derivatives, and Related Products)  
Section cross-reference(s): 59

IT Limestone, uses and miscellaneous  
(**desulfurization** agent, for manuf. of coal briquets)

L40 ANSWER 10 OF 13 HCA COPYRIGHT 2004 ACS on STN

103:220128 Emissions control at a coke-fired cogeneration plant. Shroff, G. H.; Papa, A. F.; Whalen, J. M. (Bechtel Power Corp., Gaithersburg, MD, 20877, USA). Chemical Engineering Progress, 81(10), 51-6 (English) 1985. CODEN: CEPRA8. ISSN: 0009-2495.

AB Unburned C, ash, **SO2**, and acid mist emission control at a **petroleum coke**-fired cogeneration power plant is described. The facility has a boiler optimized for burning pulverized coke and an integrated flue gas **desulfurization** (FGD) system. A spray tower limestone system removes 90% of the **SO2**. A wet electrostatic precipitator removes the H2SO4 mist. High quality gypsum is produced from the FGD waste and the H2SO4 collected by the wet pptn. Solid **particulates**, fly ash, and C are removed by dry electrostatic pptn.

IT **7446-09-5**, uses and miscellaneous  
(removal of, from flue gas, at coke-fired power plant)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 51

ST flue gas **desulfurization** power plant; coke fired boiler emission control; **sulfur dioxide** removal flue gas; acid mist removal flue gas; gypsum prodn flue gas



- desulfurization**
- IT Flue gases  
(**desulfurization** of, at coke-fired power plant)
- IT **Coke**  
(**petroleum**, as fuel for power plant, emission controls for)
- IT 13397-24-5P, preparation  
(prodn. of, from flue gas **desulfurization** products, at coke-fired power plant)
- IT 7440-44-0, uses and miscellaneous **7446-09-5**, uses and miscellaneous **7664-93-9**, uses and miscellaneous  
(removal of, from flue gas, at coke-fired power plant)
- L40 ANSWER 11 OF 13 HCA COPYRIGHT 2004 ACS on STN  
102:118776 Performance of dry flue gas **desulfurization** on a **petroleum coke** kiln application. Horn, R. J.; Bent, J. F. (Ecolaire Environ. Co., Pleasant Hill, CA, USA). Proceedings - APCA Annual Meeting, 77th(Vol. 5), 84-98.2, 12 pp. (English) 1984. CODEN: PAAME3. ISSN: 0193-9688.
- AB A dry flue gas **desulfurization** system consisting of a spray dryer, fabric filter, lime slaking and slurry storage system, slurry circulation system, and waste handling system effectively operates on a **petroleum coke** calcining kiln, ensuring **SO2** removal efficiency >90% and **particulate** emission <0.005 g/ACFM. The system operates in compliance with emission regulations, providing high levels of equipment reliability while requiring part-time operator supervision.
- IT **7446-09-5**, uses and miscellaneous  
(removal of, from flue gases from **petroleum coke** kilns, dry scrubber systems in)
- RN 7446-09-5 HCA
- CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

- CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 51
- ST coke kiln flue gas **desulfurization**; dry **desulfurization** kiln flue gas
- IT Flue gases  
(**desulfurization** of, from **petroleum coke** kilns, dry scrubber system in)
- IT Kilns  
(for **petroleum coke** calcination, flue gases from, **desulfurization** of, dry scrubber systems in)
- IT **Particles**

(removal of, from flue gases from **petroleum coke kilns**, dry scrubber **desulfurization** systems in)

IT Scrubbers

(dry, in **desulfurization** of flue gases from **petroleum coke kilns**)

IT Coke

(**petroleum**, calcination of, flue gases from kilns for, **desulfurization** of, dry scrubber systems in)

IT 7446-09-5, uses and miscellaneous

(removal of, from flue gases from **petroleum coke kilns**, dry scrubber systems in)

L40 ANSWER 12 OF 13 HCA COPYRIGHT 2004 ACS on STN

101:176677 Performance of dry flue gas **desulfurization** on a **petroleum coke** kiln application. Horn, R. J.; Bent, J. F. (Ecolaire Environ. Co., Pleasant Hill, CA, USA). Journal of the Air Pollution Control Association, 34(9), 982-6 (English) 1984. CODEN: JPCAAC. ISSN: 0002-2470.

AB A dry flue gas **desulfurization** system is described which is operating successfully on a **petroleum coke** calcining kiln. Acceptance tests and continuous data logging demonstrate **SO2** removal efficiencies >90%, and **particulate** emissions <0.005 g/ft<sup>3</sup>. The system consists of a spray dryer, fabric filter and auxiliaries which are designed to process ≤205,000 ft<sup>3</sup> gas flow. Continuing development work on system components has resulted in system availability exceeding 90%, while requiring an av. of 4 man-hours per shift of operator supervision. A preventive maintenance program which includes routine operator inspections and data acquisition has served to reduce forced outgas and maximize prodn.

IT 7446-09-5, uses and miscellaneous

(removal of, from flue gas, by dry scrubbing system)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 51

ST flue gas dry **desulfurization**; **sulfur dioxide** removal flue gas; coke kiln flue gas **desulfurization**

IT Particles

(removal of, from flue gas, by dry scrubbing system)

IT Flue gases

(**sulfur dioxide** removal from, by dry

- scrubbing system)
- IT Coke  
(metallurgical, redn. of, flue gas dry **desulfurization**  
in)
- IT 7446-09-5, uses and miscellaneous  
(removal of, from flue gas, by dry scrubbing system)

L40 ANSWER 13 OF 13 HCA COPYRIGHT 2004 ACS on STN

71:83257 Transformation of organosulfur compounds in **petroleum coke**. Syunyaev, Z. I.; Gimaev, R. N.; Abyzgil'din, Yu. M.; Malyatova, G. P.; Zaitseva, S. G. (Ufim. Neft. Inst., Ufa, USSR). Khimiya Seraorganicheskikh Soedinenii, Soderzhashchikhsya v Neftyakh i Nefteproduktakh, 8, 381-6 (Russian) 1968. CODEN: KSSBAP. ISSN: 0368-6876.

AB Studied were the properties and compn. of S-contg. compds. in **petroleum coke**, their behavior during interaction of the coke with boiling 60% HNO<sub>3</sub>, and their reactions at high temps. Elemental S was detd. as **S<sub>2</sub>O<sub>3</sub>** ion on extn. of the coke with an aq. soln. of Na<sub>2</sub>SO<sub>3</sub>, and disulfides were estd. colorimetrically on boiling the material with an aq. soln. of Na<sub>2</sub>S. The treatment with HNO<sub>3</sub> led to an increase in the content of O and N (up to 30-5% O + N in a **powdery** coke sample after 4 hrs.), and the content of C decreased due to the oxidn. During the first 4 hrs. of the treatment, the **desulfurization** rate of the **powdery** coke was 1.5 times to twice as high as the C burning-off rate. The **desulfurization** degree of cokes obtained by the retarded carbonization was only slight; it could, however, be increased more than twice by preliminary heat-treatment at 700-800° whereas heating at temps. above 800° slowed down the **desulfurization**. H<sub>2</sub>S began to appear in the gases at 550°. The amt. of S in the coke after contacting with H<sub>2</sub>S depended on the coke nature and **grain** size, temp., residence time, and gas inlet space rate. H<sub>2</sub>S interacted with the coke at 500-1000°. The preliminary heat-treatment of the material, particularly at temps. above 600°, substantially reduced the S-absorbing capacity; thus, on treatment at 1400°, the coke sulfurization decreased by 8-10 times as compared with the thermally untreated coke samples. The high-temp. changes appeared to involve decompn. of the S-contg. compds. of low thermal stability with formation of H<sub>2</sub>S, its immediate adsorption, and successive desorption, internal diffusion, and thermal dissocn. with subsequent formation of more stable S-contg. compds. Decompn. of the secondary S-contg. compds. began at 1200° and proceeded rapidly at 1400-1600° with formation of, e.g., diphenyl sulfides, whereas little or no **desulfurization** occurred at 500-1000° due to secondary interaction of H<sub>2</sub>S with the coke. For enhancing the coke **desulfurization** degree, H<sub>2</sub>S should be bound chem. with the

use of an addnl. solid reagent or driven off with a carrier gas, preferably at elevated pressure.

CC 51 (Petroleum, Petroleum Derivatives, and Related Products)

ST sulfur compds **petroleum coke; petroleum coke** sulfur compds; **coke petroleum** sulfur compds; **desulfurization petroleum coke**

IT **Coke**  
(**petroleum**, nitric acid reaction with sulfur compds. in)

IT 7704-34-9, Sulfur  
(reaction of, with nitric acid in **petroleum coke**)

IT 7783-06-4, reactions  
(with nitric acid in **petroleum coke**)

IT 7697-37-2, reactions  
(with sulfur compds. in **petroleum coke**)

=> file wpids

FILE 'WPIDS' ENTERED AT 12:51:27 ON 05 AUG 2004

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FILE LAST UPDATED: 2 AUG 2004 <20040802/UP>

MOST RECENT DERWENT UPDATE: 200449 <200449/DW>

DERWENT WORLD PATENTS INDEX SUBSCRIBER FILE, COVERS 1963 TO DATE

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L38 ANSWER 1 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2004-400651 [37] WPIDS

DNC C2004-150085

TI Production of modified coke product comprises pyrolysis of coal and rubber **granules** at high temperature in a reduced oxygen atmosphere.

DC H09 M24

IN CALVERLEY, R R

PA (CALV-I) CALVERLEY R R

CYC 107

PI WO 2004041968 A1 20040521 (200437)\* EN 19 C10B057-04

RW: AT BE BG BW CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE  
IT KE LS LU MC MW MZ NL OA PT RO SD SE SI SK SL SZ TR TZ UG  
ZM ZW

W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ  
DE DK DM DZ EC EE EG ES FI GB GD GE GH GM HR HU ID IL IN IS  
JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX

MZ NI NO NZ OM PG PH PL PT RO RU SC SD SE SG SK SL SY TJ TM  
 TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

ADT WO 2004041968 A1 WO 2003-GB4736 20031104

PRAI GB 2002-25859 20021106

IC ICM C10B057-04

AB WO2004041968 A UPAB: 20040611

NOVELTY - Production of a modified coke product comprises separately forming coal and rubber **granules**, mixing the **granules** and heating above 1000 deg. C in a reduced oxygen atmosphere to pyrolyse the mixed coal and rubber **particles** (5 - 10 wt%).

USE - For manufacturing modified coke products for domestic and industrial use.

ADVANTAGE - The process provides an economic and satisfactory smokeless fuel product. Pyrolysis in oxygen free atmosphere ensures that no carbon residue is oxidized to carbon monoxide or carbon dioxide. Pyrolysis at an elevated temperature over 1000 deg. C avoids the formation of hazardous dioxins and furans which are created in an oxygen rich atmosphere at 200 - 500 deg. C. Immediate spray-cooling step to cool the effluent gases below 200 deg. C prevents re-synthesis of dioxins and furans. Economically useful product such as nitrous and **sulfur oxide** may be recovered from the effluent gases before treatment for safe disposal. During pyrolysis stage, rubber expands releasing gases and oils much earlier than coals, causing rapid **fluidization** of the **coke** oven accelerating the process of heat distribution and expansion of battery contents. By limiting the quantity of rubber **particulates** of a size less than 2 mm in the blend, the amount of losses due to wind erosion particularly during handling and conveying of feedstock are reduced.

DESCRIPTION OF DRAWING(S) - The figure shows the process for production of coke

conveyor 1

shredder 2

**granulator** 3

grinding mill 4

mixture 5

air conveyor 6

blender 7

stream 8

oven 9

burners 10

spray cooler. 11

Dwg.1/1

FS CPI

FA AB; GI

MC CPI: H09-A02; M24-A01B

L38 ANSWER 2 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2004-374214 [35] WPIDS

DNC C2004-140734

TI Reducing the concentration of **sulfur oxides** in *fluid case* flue gas and smelter gas in the production of treated gas, activated carbon and elemental sulfur, involves treating the gases with **fluid coke** at high temperature.

DC E36 H08 J01

IN JIA, C Q

PA (JIAC-I) JIA C Q

CYC 101

PI US 2004076570 A1 20040422 (200435)\* 14 C01B017-02

CA 2408858 A1 20040418 (200435) EN B01D053-60

WO 2004035176 A1 20040429 (200435) EN B01D053-04

RW: AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT  
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ZW

W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ  
DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP  
KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ  
NO NZ OM PH PL PT RO RU SD SE SG SK SL SY TJ TM TN TR TT TZ  
UA UG US UZ VN YU ZA ZM ZW

ADT US 2004076570 A1 US 2003-681210 20031009; CA 2408858 A1 CA  
2002-2408858 20021018; WO 2004035176 A1 WO 2003-CA1568 20031016

PRAI CA 2002-2408858 20021018

IC ICM B01D053-04; B01D053-60; C01B017-02

ICS B01D053-50; B01D053-64; B01D053-75; B01J020-20; C01B031-08

AB US2004076570 A UPAB: 20040603

NOVELTY - A process of reducing the concentration of **sulfur oxides (SO<sub>x</sub>)** in a **SO<sub>x</sub>-containing gas** comprises treating the **SO<sub>x</sub>-containing gas** with an effective amount of **particulate petroleum coke** at an effective **SO<sub>x</sub> removal temperature** to produce a treated gas of reduced **SO<sub>x</sub> concentration**; and removing the treated gas.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) A process for the production of activated carbon from **particulate petroleum coke**, the process comprising treating the **petroleum coke** with an effective amount of a **SO<sub>x</sub>-containing gas** at an effective temperature to effect reduction of the **SO<sub>x</sub> concentration** in the gas to produce a treated gas of reduced **SO<sub>x</sub> concentration** and the activated coke; and collecting the activated coke;

(2) A process for the production of elemental sulfur from a **SO<sub>x</sub>-containing gas** and **particulate petroleum coke**, the process comprising treating

the **petroleum coke** with an effective amount of a **SOx**-containing gas at an effective temperature to effect reduction of the **SOx** concentration in the gas to produce a treated gas of reduced **SOx** concentration, the activated carbon and the elemental sulfur; and collecting the activated carbon and the elemental sulfur; and

(3) A process for recovering the heat of reaction in the process further comprising

(a) reacting a feed **SOx**-containing gas with a **petroleum coke** at an effective **SOx**

-reducing temperature to produce an effluent gaseous mixture, at a temperature of greater than 600 deg. C, comprising sulfur and of a reduced **SOx** concentration relative to the feed gas;

(b) passing the effluent gas to heat exchange means comprising a transfer fluid to effect heat transfer to the transfer fluid to produce a hotter transfer fluid and cool the gas to a temperature below 200 deg. C; and

(c) collecting the sulfur and the hotter transfer fluid.

USE - Production of treated gas of reduced **sulfur oxide** content, activated carbon and elemental sulfur (claimed).

ADVANTAGE - The process converts **sulfur dioxide**, a waste gas and environmental pollutant, to a non-polluting sulfur state, which is more easily handled, stored or transported and which has economic value. The process also allows the unreactive carbon to be converted into a higher surface area activated carbon with additional sulfur content. The activated carbon prepared by reducing concentration of **sulfur oxide** provides valuable properties for application such as a mercury scrubbing agent and is a most environmentally useful absorbent for both organic and inorganic species. The complete conversion of **sulfur dioxide** to elemental sulfur is achieved in about 8 seconds at 700 deg. C with 95% of sulfur yield.

Dwg.0/10

TECH US 2004076570 A1UPTX: 20040603

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Process: The **petroleum coke** is a **fluid coke**

. The effective temperature is 600-1000 deg. C. The **SOx** concentration is at least 1% v/v in the **SOx**-containing gas. The **SOx**-containing gas is a flue or smelter gas. The **SOx**-containing gas further comprises nitrogen oxide (NOx) species, and the effective **SOx** removal temperature is also a NOx species removal temperature. The **SOx**-containing gas further comprises metal species, and the **SOx** removal temperature is also a metal species removal temperature. The metal is mercury.

KW [1] 48-0-0-0 CL REM; 104-0-0-0 CL REM; 2211-0-0-0 CL PUR; 363-0-0-0

CL PUR; 103243-0-0-0 CL  
 FS CPI  
 FA AB; DCN  
 MC CPI: E10-J02D; E11-Q01; E11-Q02; E31-F01A; E31-F02; E31-N03;  
 H08-E01A; H08-E02; J01-E02  
 DRN 1669-P; 1669-U; 1674-U; 1675-U; 1725-P; 1725-U  
 CMC UPB 20040603  
 M3 \*01\* C108 C216 C540 C730 C800 C801 C802 C803 C804 C805 M411 M750  
 M904 M905 M910 N163 N515  
 DCN: R01674-K; R01674-X  
 M3 \*02\* C108 C316 C540 C730 C800 C801 C802 C803 C804 C805 M411 M750  
 M904 M905 M910 N163 N515  
 DCN: R01675-K; R01675-X  
 M3 \*03\* C106 C810 M411 M720 M904 M905 M910 N163 N515 Q417  
 DCN: R01669-K; R01669-P; R05085-K; R05085-P  
 M3 \*04\* C116 C810 M411 M720 M904 M905 M910 N163 N515 Q417  
 DCN: R01725-K; R01725-P  
 M3 \*05\* M210 M211 M212 M213 M214 M215 M216 M220 M221 M222 M223 M224  
 M225 M226 M231 M232 M233 M320 M416 M610 M620 M781 M905 N163  
 R023  
 DCN: RA00NG-K; RA00NG-R

L38 ANSWER 3 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
 AN 2003-732486 [70] WPIDS  
 DNC C2003-201945  
 TI Cyclic **fluidized** bed active **coke**  
**desulfurizing** and sulfur reutilization method.  
 DC E36 J01  
 IN FENG, Z; LI, C; LI, Z  
 PA (POWE-N) STATE POWER STATION COMBUSTION ENG TECH  
 CYC 1  
 PI CN 1435273 A 20030813 (200370)\* B01D053-12  
 ADT CN 1435273 A CN 2002-109104 20020129  
 PRAI CN 2002-109104 20020129  
 IC ICM B01D053-12  
 ICS B01D053-83; C01B017-04  
 AB CN 1435273 A UPAB: 20031030  
 NOVELTY - A **desulfurizing** process with circulating  
 fluidized bed for the flue gas at 70-200 deg.C containing  
**SO2** and NOx is new.

DETAILED DESCRIPTION - A **desulfurizing** process with  
 circulating fluidized bed for the flue gas at 70-200 deg.C  
 containing **SO2** and NOx in which the flue gas and the  
 active coke as **desulfurizing** agent are continuously fed in  
 the reactor of **desulfurizing** tower for removing  
**dust, SO2** and NOx, the clean flue gas flows in  
 chimney for exhausting it, the active coke is regenerated then in  
 regenerating tower for further using it in **desulfurizing**



tower, and **SO2** is reduced to become sulfur to be recovered.

ADVANTAGE - Its advantages are high **desulfurizing** efficiency, low cost and water consumption, and no secondary pollution.

Dwg.0/0

FS CPI

FA AB

MC CPI: E11-Q02; E31-F01A; E31-H02; J01-E02

L38 ANSWER 4 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2003-542621 [52] WPIDS

DNN N2003-430382

TI Method and device for burning **petroleum coke** by use of circulating fluid bed.

DC Q73

IN SHEN, B; XIANG, G; YAO, Q

PA (UYQI) UNIV QINGHUA

CYC 1

PI CN 1415890 A 20030507 (200352)\*

F23B007-00

ADT CN 1415890 A CN 2001-134299 20011031

PRAI CN 2001-134299 20011031

IC ICM F23B007-00

AB CN 1415890 A UPAB: 20030813

NOVELTY - This invention relates to a method and device for using oil coke as fuel in circulation fluidized bed solving the difficulties of burned-out in burning, **desulfurization** and lumping, slag-bonding appearing in end flue pipe and cyclone separator in the circulation fluidized bed. This invented oil coke combined fuel includes oil coke, coal and **desulfurizer** which can effectively removed **SO2** and eliminate lumping and slag-bonding phenomenon and big mesh sieving is applied for oil coke **particles** to form thicken or thin phase beds in firing chamber, suitable for subjects balance in bed; warm scuff-resistant coating is designed under the circulation fluidized bed to form high temperature zone good for firing of oil coke and burning-out, stepped burning is good for reducing NOx exhaust.

Dwg.0/0

FS GMPI

FA AB

L38 ANSWER 5 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2002-611954 [66] WPIDS

DNN N2002-484605 DNC C2002-173611

TI Estimation of **desulfurization** rate in fluidized bed combustion apparatus, involves calculating exterior layer flow velocities of **desulfurizing** agents with different grain sizes, based on which rate is estimated.

DC J09 Q72 Q73  
 PA (DNGK) DENGEN KAIHATSU KK  
 CYC 1  
 PI JP 2002174405 A 20020621 (200266)\* 14 F23C010-00  
 ADT JP 2002174405 A JP 2000-371880 20001206  
 PRAI JP 2000-371880 20001206  
 IC ICM F23C010-00  
 ICS F22B001-02; F23C010-16  
 ICA B01D053-50; B01D053-81  
 AB JP2002174405 A UPAB: 20021014

NOVELTY - The exterior layer flow velocities of **desulfurizing** agents having different grain sizes are calculated using parameters such as mean particle diameter (Dpi, Dpj), weight fraction (fi,fj), supply velocity (F) and particle density ( rho ) of corresponding grain size. The **desulfurization** rate is estimated using the calculated flow velocities represented by a specific equation.

DETAILED DESCRIPTION - The **desulfurizing** agent is supplied into the pressurization fluidized bed combustion device to burn the sulfur content.

An INDEPENDENT CLAIM is included for **desulfurization**, which involves extracting the used **desulfurizing** agent from the furnace bottom portion of a combustion device. The used **desulfurizing** agent is ground and supplied to the pressurization fluidized bed combustion device. The fluid bed has a cross section of 1 m2, into which **desulfurizing** agent is supplied at a rate of 1000 m2/hour and 400-800 m2/hour. A dust removal apparatus circulates the ash, and removes the dust.

USE - For estimating the **desulfurization** rate in a fluidized bed combustion apparatus using coal, **petroleum** or **coke**, in a thermal power plant.

ADVANTAGE - The **desulfurization** rate is estimated accurately, hence operation control of the combustion apparatus is improved. The amount of **sulfur oxide** in the combustion gas is reduced. Recycling of **desulfurizing** agent is improved.

DESCRIPTION OF DRAWING(S) - The figure shows a block diagram of the fluidized bed combustion apparatus.

Dwg.1/5

FS CPI GMPI  
 FA AB; GI  
 MC CPI: J09-A

L38 ANSWER 6 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2001-532828 [59] WPIDS

DNN N2001-408819 DNC C2001-163951

TI Melt processing of waste comprises forming deposit by inserting waste, solid fuel and limestone from top of direct-type gasifying

melting furnace, burning solid fuel while introducing oxygen gas.

DC J09 Q73

PA (DNGK) DENGEN KAIHATSU KK

CYC 1

PI JP 2001201022 A 20010727 (200159)\* 5 F23G005-00

ADT JP 2001201022 A JP 2000-4953 20000113

PRAI JP 2000-4953 20000113

IC ICM F23G005-00

ICS F23G005-027; F23G005-24

AB JP2001201022 A UPAB: 20011026

NOVELTY - **Petroleum coke** is used as all or part of the solid fuel. A region is formed in which a part of limestone is heat decomposed to calcium oxide (CaO) by heat transfer by contact and stirring with high temperature particles of at least 750 deg. C in the deposit top layer. The **sulfur oxides** produced by burning the **petroleum coke** are reacted with CaO in the high temperature region producing calcium sulfate to effect **desulfurization**. Combustible gases are heat recovered by burning in an outer combustion chamber.

DETAILED DESCRIPTION - Melt processing of waste comprises forming a deposit by inserting waste, solid fuel and limestone from the top of a direct-type gasifying melting furnace, burning the solid fuel while introducing oxygen gas to the deposit lower part from the tuyere, settling the ash and non-combustibles to the furnace bottom and removing as a slag, and removing the flammables in the waste as a flammable gas to the outside.

USE - Used for waste disposal and recovering combustion heat from burnt combustible gases produced.

ADVANTAGE - Melt processing of waste is carried out without increasing operating costs.

DESCRIPTION OF DRAWING(S) - The figure shows a waste material electricity-generation boiler.

Gasification Melting Furnace 1

Charging Apparatus 2

Waste Material 3

Solid Fuel 4

Limestone 5

Deposit 6

Tuyere 7

Oxygen-Containing Gas 8

Furnace Floor Bed 9

Molten Slag 10

Deposit Upper Space 11

Duct 12

Combustion Furnace 13

Burner 14

Air Blower 15

Electricity Generation Boiler 16

Electricity Generation Installation 17  
Cut-Off Device of Ashes 18

Dwg.1/1

FS CPI GMPI  
FA AB; GI  
MC CPI: J09-C

L38 ANSWER 7 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2001-184582 [19] WPIDS

DNN N2001-131716 DNC C2001-055522

TI Binding and stabilizing powdered or granulated residues containing heavy metals, comprises pre-mixing residues with ash and water, mixing obtained mass with quick lime, and compacting into blocks.

DC D15 J01 J09 L02 P43

IN BLONDIN, J

PA (ELTH-N) SOC NAT ELECTRICITE & THERMIQUE

CYC 2

PI FR 2797597 A1 20010223 (200119)\* 17 B09B003-00

CZ 2000003034 A3 20010411 (200130) B09B003-00

ADT FR 2797597 A1 FR 1999-10606 19990818; CZ 2000003034 A3 CZ 2000-3034 20000818

PRAI FR 1999-10606 19990818

IC ICM B09B003-00

ICS B09B001-00; C04B028-12

ICA B01D053-64

ICI C04B018:06, C04B028-12

AB FR 2797597 A UPAB: 20010405

NOVELTY - Binding and stabilizing powdered or granulated residues containing heavy metals comprises introducing binder in two stages, by first adding ash component, at a pre-mixing stage, and then a lime component, at a mixing stage.

DETAILED DESCRIPTION - Binding and stabilizing residues into form of blocks or layers comprises mixing the residues with a binder containing combustion ash and lime, and with water, followed by compacting. To improve results, the process comprises a stage of pre-mixing of residues with ash and water, followed by mixing the obtained mixture with quick lime.

USE - As a method of binding and stabilizing residues obtained during purification of gaseous effluents from garbage incineration plants.

Dwg.0/0

TECH FR 2797597 A1 UPTX: 20010405

TECHNOLOGY FOCUS - ENVIRONMENT - Preferred Material: The starting material comprises residues from the purification of gaseous effluents from garbage incineration plants and may also contain, in a small part, other liquid, solid or pasty waste materials. Preferred Reagents: The ash is in powdered form and is obtained as a result of charcoal combustion in a fluidized bed, or from the

combustion of sludges, **coke** and/or **petroleum** pitch, or biomass preferably containing a fume **desulfurizing** agent. The binder optionally contains gypsum, in an amount up to 2% (per **S03**).

Preferred Process: Pre-mixing is conducted using kneading power and a process time sufficient to produce a sand-like or pellet consistency, and mixing with quick lime is conducted using kneading power and a process time sufficient to produce a homogeneous consistency; with the kneading power being preferably the same for both stages, and a mixing stage following directly the pre-mixing stage. The duration of the pre-mixing stage is preferably 1-3 times of that of the mixing stage, and the total duration of pre-mixing and mixing stages is below 10 minutes. The total amount of water used is 30-40 wt.% per total dry weight of the residues + ash + lime.

Preferred Composition: The dry mixture (not counting water) comprises 30-50% of binder, in form of ash and lime, and 50-30% of starting residue material. The binder is formed of 70-80% of fluidized bed ash and 20-30% of quick lime. The latter amounts to at least 10% of dry mixture of residues, ash and lime.

Preferred Method: Final compacted blocks and layers are obtained by compacting of mixture to humid density 1.6-1.8, preferably using static compacting method.

FS CPI GMPI  
FA AB  
MC CPI: D04-B10; J01-E02; J09-C; L02-B01

L38 ANSWER 8 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2001-138852 [15] WPIDS

DNC C2001-041124

TI Portland cement clinker production using circulating fluidized bed boiler involves selecting solid **desulfurizer** from lime, clay, and/or iron ore, collecting ashes from boiler, removing sulfur adsorbed in ashes and cooling ashes.

DC H09 L02 Q73

IN MARTINEZ-VERA, E R; MARTINEZ, V E R

PA (CEME-N) CEMEX CENT SA DE CV; (CEME-N) CEMEX CENT CO LTD; (CEME-N) CEMEX CENT SA CV

CYC 5

PI	CA 2313862	A1 20010119 (200115)*	EN 19	C04B007-28
	FR 2797628	A1 20010223 (200115)		C04B007-28
	CN 1285330	A 20010228 (200131)		C04B007-28
	RU 2184094	C2 20020627 (200255)		C04B007-45
	ES 2181544	A1 20030216 (200322)		C04B007-28
	ES 2181544	B1 20040616 (200441)		C04B007-28

ADT CA 2313862 A1 CA 2000-2313862 20000713; FR 2797628 A1 FR 2000-9500 20000719; CN 1285330 A CN 2000-126825 20000719; RU 2184094 C2 RU 2000-119207 20000718; ES 2181544 A1 ES 2000-1778 20000718; ES

2181544 B1 ES 2000-1778 20000718

PRAI US 1999-357057 19990719

IC ICM C04B007-28; C04B007-45

ICS B01D053-48; C01B017-00; C04B007-02; C10L010-00; F23C010-00;  
F23J007-00; F23J015-00

ICI F23C101:00

AB CA 2313862 A UPAB: 20010317

NOVELTY - Production of Portland cement clinker as a by-product of a circulating fluidized bed (CFB) boiler fueled with high sulfur content fuel comprises selecting a solid **desulfurizer** from lime, clay, iron ore and their mixtures, collecting ashes evolving from the boiler, removing sulfur adsorbed in ashes by heating to 1200-1300 deg. C, cooling the ashes and using them for the production of Portland cement.

DETAILED DESCRIPTION - The **desulfurizing** agent mixture complies with the following conditions:

LSF =  $\%CaO / (2.8 \text{ multiply } \%SiO_2 + 1.18 \text{ multiply } \%Al_2O_3 + 0.65 \text{ multiply } \%Fe_2O_3)$  = 0.75-0.90; and

MS =  $SiO_2 / (Al_2O_3 + Fe_2O_3)$  = 2.5-3.5.

The cold ashes contain less than 5%  $CaSO_4$ .

Ashes evolving from the boiler are heated in a fluidized bed heater, in which tricalcium silicate, dicalcium silicate, tricalcium aluminate and tetracalcium aluminoferrite are formed. Hot gas from a combustion chamber is fed to the fluidized bed heater.

Hot ashes are cooled with air in a fluidized bed cooler.

Effluent gases from the fluidized bed heater are treated to produce sulfur, sulfuric acid and sulfur derivatives.

INDEPENDENT CLAIMS are given for

(a) a method of operating the CFB boiler fueled with a high sulfur content fuel, preferably, **petroleum coke**, where the **desulfurizing** agent increases the overall efficiency of the boiler; and

(b) a method of producing Portland cement clinker as a by product of the CFB boiler fueled with the high sulfur content fuel.

USE - Portland cement clinker production.

ADVANTAGE - The CFB boiler has increased thermal efficiency, reduced discharge of  $CO_2$  during operation. An  $SO_2$ -rich gas is produced which can be used as a source for the production of sulfur, sulfuric acid or sulfur derivatives.

Dwg.0/3

FS CPI GMPI

FA AB

MC CPI: H09-H02; L02-C03

DRN 1066-U; 1503-U; 1674-U; 1694-U; 1714-U; 1725-U

L38 ANSWER 9 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2000-224629 [19] WPIDS

DNC C2000-068690

TI Production of premium grade **petroleum coke** fuel with controlled amounts of combustible material involves thermal cracking of a coke precursor derived from crude oil and having volatile organic component.

DC H04 H08

IN ETTER, R G; ETTER, R

PA (ETTE-I) ETTER R; (ENVI-N) ENVIRONMENTAL & ENERGY ENTERPRISES LLC; (ETTE-I) ETTER R G

CYC 86

PI WO 2000010914 A1 20000302 (200019)\* EN 189 C01B017-22  
 RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC  
 MW NL OA PT SD SE SL SZ UG ZW  
 W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES  
 FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK  
 LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG  
 SI SK SL TJ TM TR TT UA UG US UZ VN YU ZA ZW  
 AU 9956841 A 20000314 (200031) C01B017-22  
 US 6168709 B1 20010102 (200103) C10G009-14  
 GB 2357518 A 20010627 (200137) C10G009-14  
 US 2002179493 A1 20021205 (200301) C10G009-00  
 GB 2357518 B 20030319 (200321) C10G009-14

ADT WO 2000010914 A1 WO 1999-US19091 19990820; AU 9956841 A AU 1999-56841 19990820; US 6168709 B1 US 1998-137283 19980820; GB 2357518 A WO 1999-US19091 19990820, GB 2001-5114 20010301; US 2002179493 A1 CIP of US 2000-556132 20000421, CIP of US 2001-763282 20010220, US 2001-27677 20011220; GB 2357518 B WO 1999-US19091 19990820, GB 2001-5114 20010301

FDT AU 9956841 A Based on WO 2000010914; GB 2357518 A Based on WO 2000010914; GB 2357518 B Based on WO 2000010914

PRAI US 1998-137283 19980820

IC ICM C01B017-22; C10G009-00; C10G009-14  
 ICS C10G045-00; C10G047-00; C10L001-10; C10L005-00; C10L007-00

AB WO 200010914 A UPAB: 20000419  
 NOVELTY - A thermal cracking process is used to produce premium grade coke fuel of controlled combustible material, which can sustain self-combustion, reduce corrosive ash deposits and avoid the need for coke decontamination.  
 DETAILED DESCRIPTION - Production of coke fuel involves obtaining a coke precursor derived from crude oil and having a volatile organic component and thermal cracking the precursor for time and at temperature and pressure sufficient to produce coke product containing 13-50 wt.% volatile combustible materials.  
 INDEPENDENT CLAIMS are included for:  
 (a) a coke product;  
 (b) producing energy by combusting the above fuel; and  
 (c) producing energy and removing undesirable flue gas components by injection of conversion reagents with sufficient residence time to convert undesirable flue gas components to

collectible **particulates** upstream of **particulate** control device and collecting the **particulates** in the device which can be electrostatic precipitators, filtration, cyclones or conventional wet scrubbers.

USE - For use as fuel, in steel and aluminum manufacture, or as an adsorption medium.

Dwg.1/5

TECH WO 200010914 A1UPTX: 20000419

TECHNOLOGY FOCUS - ORGANIC CHEMISTRY - Preferred Process: The coke precursor is subjected to desalting prior to (b) to reduce sodium levels to less than 15 ppm weight. The coke crystalline structure is altered to promote the production of sponge coke and sponge coke levels are maintained within the range of 40-100%. The fuel comprises a mixture of coke and coal at a heat release ratio of more than 1:4. Unreacted flue gas conversion reagents are recycled to increase reagent utilization, preferably the recycle rate is more than 5 wt.% of the collected fly ash, preferably more than 70 wt.%. The regeneration can be hydration, precipitation or other unit operations. Valuable metals are extracted and purified from the purge stream from the regeneration process. The coke precursor is derived from crude oil, tar sands or coal. At least one chemical compound is introduced into the thermal cracking process to improve the adsorption characteristics of the coke product, preferably the compound is hydrogen, plastics, wood wastes, coals or non-volatile hydrocarbons with appropriate cracking/**coking** characteristics. A **fluid** such as **coke** quench medium is selectively added to the coke to remove sulfur, nitrogen and/or metal. The coke is calcined to remove excessive volatile combustible materials and the crystalline structure is altered to provide low-porosity coke of density suitable for use in steel or aluminum manufacture, or can be adapted for use as an adsorption medium e.g. for flue gas components e.g. **sulfur oxides**, nitrogen oxides, carbon dioxide, dioxins, furan, mercury compounds, and/or as fuel. The fuel can comprise a mixture of coke and at least one other fuel which can be coal, fuel oil, natural gas, byproducts and/or waste.

FS CPI

FA AB; GI

MC CPI: H04-B01; H08-E02

DRN 1066-U; 1881-U; 1901-U; 1902-U

L38 ANSWER 10 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1994-111569 [14] WPIDS

DNN N1994-087384 DNC C1994-051453

TI Recovery of lead from used batteries - in two-stage electric furnace which eliminates sulphur as sulphur di oxide.

DC L03 M25 Q77 X16

IN BIED-CHARRETON, B; CHABRY, P; LECADET, J; PASQUIER, P



PA (META-N) METALEUROP SA

CYC 12

PI FR 2695651 A1 19940318 (199414)\* 17 C22B013-00

EP 594470 A1 19940427 (199417) FR 9 C22B013-02

R: BE DE ES GB IT LU NL SE

CA 2106014 A 19940312 (199421) FR C22B013-02

JP 06279878 A 19941004 (199444) 7 C22B013-00

US 5467365 A 19951114 (199551) 7 F27D017-00

ADT FR 2695651 A1 FR 1992-10849 19920911; EP 594470 A1 EP 1993-402206  
19930910; CA 2106014 A CA 1993-2106014 19930913; JP 06279878 A JP  
1993-221808 19930907; US 5467365 A US 1993-119410 19930909

PRAI FR 1992-10849 19920911

REP DE 2600384; FR 2342345; US 4571261

IC ICM C22B013-02; F27D017-00

ICS C22B007-00; C22B013-06; F27B001-09; F27D011-04

ICA H01M010-54

AB FR 2695651 A UPAB: 19940524

Lead is recovered from waste solids by (a) melting in a slightly reducing condition in the presence of a small quantity of carbon so that working lead (12) and a slag (7) rich in lead are sepg. out, the sulphur is eliminated as **sulphur dioxide**;

(b) reducing the slag by adding sufficient carbon to produce a slag almost free from lead and working lead; and (c) recovering the lead from stage (b) and possibly stage (a).

The **SO2** is given off in large quantities with a small amt. of CO2. About 30-40% of the evolved gas is **SO2**.

The first and second stages are carried out at 600-1100 deg.C (pref. 700-1000) and 900-1500 deg.C, respectively.

The carbon is added as **coke, petroleum coke, coke powder**, graphite, carbon black, charcoal, anthracite etc.. The starting material has a compsn. (in wt.%) 10-95 Pb; 1-112 S (as sulphate), 0-10 C; 0-80 slagging material; balance oxygen, other metals and other organic cpds..

The amt. of carbon added during the first stage is sufficient to produce a Pb content of 10-60% in the slag obtained and a carbon content of 2-4%, pref. 3%.

The amt. of carbon added during the second stage is 5-30 wt.% w.r.t. the amt. of PbO formed in the first stage and which is present in the slag. A flux contg. iron oxide, calcium oxide and possibly silicon dioxide is added during the first stage.

USE/ADVANTAGE - Recovering lead from old batteries. The **SO2** is eliminated in the first stage and is obtained in a form which is concentrated enough to facilitate its recovery. The final slag obtd. can be stored without fear of pollution, or reused in construction work. The amt. of lead dust produced during the process is reduced.

Dwg.1/1

ABEQ US 5467365 A UPAB: 19951221

A process for recovering lead from residues which after melting contain (percent) 10-95 lead, 1-12 sulphur, 0-4 carbon and 0-80 slag forming materials. The melt is held at 600-1100 deg. in the presence of 2-4% carbon to give a slag layer contg. 10-60% lead. Additional carbon is then added (5-30%) to reduce the lead oxides present while heating to 900-1500 degrees C. Finally a lead-free slag and a crude lead stream are separately recovered.

USE/ADVANTAGE - To recover lead from spent batteries. All of the sulphur content is removed in the first stage as a concentrated stream of **sulphur dioxide**. This can opt. be separately recovered.

Dwg.0/1

FS CPI EPI GMPI

FA AB

MC CPI: L03-E; M25-G14

EPI: X16-X

DRN 1669-S; 1674-U

L38 ANSWER 11 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1992-184135 [23] WPIDS

DNC C1992-084343

TI Petroleum coke agglomerate fuels - contg. silica-contg. sulphur sorbent and bitumen binder.

DC H08

IN EGIEBOR, N O

PA (EGIE-I) EGIEBOR N O

CYC 1

PI CA 2026364 A 19920328 (199223)\* 15 C10L009-10

ADT CA 2026364 A CA 1990-2026364 19900927

PRAI CA 1990-2026364 19900927

IC ICM C10L009-10

ICS C01F011-02

AB CA 2026364 A UPAB: 19931006

Solid fuels comprise agglomerates of **particulate petroleum coke** with an SiO<sub>2</sub>-contg. sulphur sorbent (I) and a bitumen binder.

Pref. (I) is produced by hydrating a mixt. of Ca(OH)<sub>2</sub> and SiO<sub>2</sub> under pressure, where the Ca(OH)<sub>2</sub>:SiO<sub>2</sub> molar ratio is 1:1. The agglomerates contain 0.2-10 (esp. 0.2-5) wt.% of (I) and less than 10 wt.% bitumen, both based on the wt. of coke.

ADVANTAGE - (I) reduces **SO<sub>2</sub>** emissions when the fuels are burned.

0/4

FS CPI

FA AB

MC CPI: H08-E02

DRN 1502-S; 1694-S; 1694-U; 1725-U

L38 ANSWER 12 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
 AN 1992-033734 [05] WPIDS  
 CR 1992-209254 [26]  
 DNC C1992-094965  
 TI Redn. of sulphur di oxide discharge from small lignite furnace -  
 comprises using lignite briquette contg. lignite, anthracite,  
**petroleum coke, limestone powder,**  
 binder.  
 DC H09 J09  
 IN KLEFFMANN, G  
 PA (KLEF-I) KLEFFMANN G  
 CYC 1  
 PI DE 4039821 C 19920130 (199205)\*  
 DE 4140267 C 19921112 (199246) 3 C10L005-04  
 ADT DE 4039821 C DE 1990-4039821 19901213; DE 4140267 C DE 1991-4140267  
 19911206  
 PRAI DE 1990-4039821 19901213  
 IC ICM C10L005-04  
 ICS C10L010-04  
 AB DE 4039821 C UPAB: 19931006

**SO2** content, in the waste gases of a small furnace, is reduced by binding sulphur contained in lignite and liberated as **SO2**, during combustion, into the solid combustion residues. Finely ground, S-binding cpds., pref. CaO or cpds. which release CaO at elevated temps., are intimately blended with comminuted lignite, and opt. dried, and the dry mixt. is processed to briquettes.

The improvement is that fuels of elevated ignition temps. and heat values are added to lignite, and the briquettes produced from the dry mixt. have the following compsn.: (a) 50-80 wt.% lignite; (b) 7-20 wt.% anthracite, or a fuel of comparable heat value and ignition temp., (c) 7-20 wt.% petroleum coke; (d) 3-5 wt.% limestone powder; (e) 3-5 wt.% briquette binder; (f) remainder impurities.

ADVANTAGE - **SO2** discharge, during combustion of lignite in small furnaces, is greatly reduced.

0/0

ABEQ DE 4140267 C UPAB: 19931006

The **SO2** content in the flue gases of brown coal fired boiler plant is reduced by using briquettes consisting of, wt.%, (A) 50-80 brown coal, (B) 7-20 anthracite or another fuel having a comparably higher calorific value and ignition temp. than (A), (C) 7-20 petroleum coke, (D) 3-5 lime meal and (E) usual impurities up to 100.

(C) can be replaced at least partially by another type of coke. (D) can be replaced at least partially by Ca(OH)<sub>2</sub>, CaO or another Ca cpd. The briquettes also contain 3-5 wt.% binder.

ADVANTAGE - The **SO2** content in the flue gases can be reduced even further than previously possible.

0/0  
FS CPI  
FA AB  
MC CPI: H09-F01  
DRN 1503-U

L38 ANSWER 13 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
AN 1992-033448 [05] WPIDS  
DNC C1992-014582  
TI Reducing sulphur di oxide content of waste gas from small furnace -  
by prodn. of briquettes contg. anthracite, **petroleum**  
**coke**, limestone flour and binder.  
DC H09  
IN KLEFFMANN, G  
PA (KLEF-I) KLEFFMANN G  
CYC 1  
PI DE 4022608 A 19920123 (199205)\*  
ADT DE 4022608 A DE 1990-4022608 19900717  
PRAI DE 1990-4022608 19900717  
AB DE 4022608 A UPAB: 19931006  
The **SO2** content of waste gases from small furnaces is  
reduced by combining the S contained in the fuels, and liberated as  
**SO2** during combustion, in the solid fuel residues, by mixing  
finely ground substances which bond S, esp. CaO or cpds. liberating  
CaO at higher temps., opt. drying the mixt. and processing the mixt.  
to briquettes. Fuels with higher ignition temps. and heating values  
are provided, and the briquettes formed from the dry mixt. have the  
compsn.: 75-95wt.% of anthracite or a fuel with comparable heating  
value and ignition temp., 3-20% of **petroleum coke**  
, 3-5% of limestone flour, and 3-5% of briquette binder, the rest  
being impurities.

ADVANTAGE - A greater redn. in the **SO2** emission is  
possible, at optimum **desulphurisation** temps. of 800-900  
deg.C. Measures for **desulphurisation** of the waste gas are  
not needed.

0/0

FS CPI  
FA AB  
MC CPI: H09-F01  
DRN 1503-U

L38 ANSWER 14 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
AN 1990-100260 [14] WPIDS  
DNC C1990-044045  
TI Prepn. of catalyst by heating mixt. of petroleum coke, coal and  
binder - for redn. of oxide(s) of nitrogen and adsorption of sulphur  
di oxide(s).  
DC E36 J04

PA (FRUH-I) FRUHBUSS H

CYC 1

PI DE 3832635 A 19900329 (199014)\* 3

ADT DE 3832635 A DE 1988-3832635 19880926

PRAI DE 1988-3832635 19880926

IC B01D053-38; B01J020-20; B01J021-18; B01J023-22

AB DE 3832635 A UPAB: 19930928

A carbonaceous catalyst with adsorptive properties, esp. for redn. of NO<sub>x</sub> to N<sub>2</sub> and the adsorption of SO<sub>x</sub>, is prepd. by shaping powder or fine-grained material from **petroleum** processing (**petroleum coke**), mixed with **powdered** or fine-grain coal with 18-40 wt.% volatiles, using pitch, bitumen, tars and/or tar oils as binder, and opt. in presence of water, and heating the green mouldings to 450-1000 deg.C.

ADVANTAGE - The catalyst has high activity for redn. of NO<sub>x</sub> to N<sub>2</sub> in presence of H<sub>2</sub> donors, e.g. NH<sub>3</sub> or H<sub>2</sub>. Adsorption of SO<sub>x</sub> is more than 10 g/kg of catalyst. The catalyst has higher abrasion resistance than similar prods. obtd. solely from coal. The activity of the catalyst is not reduced by re-activation by heating at 450-1000 deg.C.

0/0

FS CPI

FA AB; DCN

MC CPI: E11-Q02; E31-F01A; E31-H01; E31-N; J01-E02B; J01-E02D; J04-E04; N04-A

DRN 1532-U; 1669-P; 1669-S; 1713-U; 1738-P; 1784-U; 1953-U

CMC UPB 19930924

M3 \*01\* C107 C108 C307 C520 C730 C800 C801 C802 C803 C804 C807 M411  
M750 M903 M904 M910 N163 N441 Q431 Q436 Q439

DCN: R01784-X

M3 \*02\* C108 C216 C316 C540 C730 C800 C801 C802 C803 C804 C805 M411  
M750 M903 M904 M910 N163 N441 Q431 Q436 Q439

DCN: R01953-X

M3 \*03\* C106 C810 M411 M720 M730 M903 M904 M910 N163 N514 N515 Q421  
Q508

DCN: R01669-C; R01669-P

L38 ANSWER 15 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1989-214516 [30] WPIDS

DNC C1989-095391

TI Prodn. of suspension in water of a high concn. of solids esp. coal or - by crushing and grinding in presence of combination of **desulphurisers**.

DC E33 H09 Q73

IN DONATI, E; ERCOLANI, D; LAGANA, V

PA (SNAM) SNAMPROGETTI SPA

CYC 16

PI EP 325309 A 19890726 (198930)\* EN 5

R: AT BE CH DE ES FR GB GR LI LU NL SE

JP 01219409 A 19890901 (198941)

US 4983187 A 19910108 (199105)

IT 1233848 B 19920421 (199242)

C10L000-00

EP 325309 B1 19940406 (199414) EN 7 C10L001-32

R: AT BE CH DE ES FR GB GR LI LU NL SE

DE 68914297 E 19940511 (199420) C10L001-32

ES 2050777 T3 19940601 (199425) C10L001-32

SU 1833407 A3 19930807 (199509) 3 C10L001-32

ADT EP 325309 A EP 1989-200014 19890104; JP 01219409 A JP 1989-10061  
19890120; US 4983187 A US 1989-293092 19890103; IT 1233848 B IT  
1988-19143 19880121; EP 325309 B1 EP 1989-200014 19890104; DE  
68914297 E DE 1989-614297 19890104, EP 1989-200014 19890104; ES  
2050777 T3 EP 1989-200014 19890104; SU 1833407 A3 SU 1989-4613300  
19890120

FDT DE 68914297 E Based on EP 325309; ES 2050777 T3 Based on EP 325309

PRAI IT 1988-19143 19880121

REP EP 158587; GB 2112807; US 4529408

IC C10L001-32; C10L009-10; F23K001-02

AB EP 325309 A UPAB: 19930923

A high-concentration solids suspension (I) which can be transported by pipe and burnt with low emission of harmful substances is prep'd. by crushing the solid (II) to be suspended to a max. particle size 6 mm, and then wet-grinding in aq. solution in presence of additives to a max. particle size 300 micron; the method is characterised by (a) adding, either before the crushing or immediately before the grinding, a **desulphuriser** (III) chosen from  $\text{CaCO}_3$ ,  $\text{MgCO}_3$ , dolomite or a mixture thereof, in mole ratio to the sulphur in (II) between 1.5 and 3; and (b) adding immediately before or during the grinding a **desulphuriser** (IV) also possessing stabilising and anticorrosive properties, chosen from  $\text{MgO}$ ,  $\text{Mg}(\text{OH})_3$ ,  $\text{CaO}$ ,  $\text{Ca}(\text{OH})_2$  or a mixture thereof, in amt. 0.04-0.4 wt.% of (I).

USE/ADVANTAGE - (II) is coal or **petroleum coke**; (I) burns with low emission of **sulphur oxides**. The combination of **desulphurisers** does not adversely affect the rheology of (I); stability of (I) is improved and its corrosivity reduced.  
0/0

ABEQ US 4983187 A UPAB: 19930923

A highly concentrated coal or **petroleum coke** solids suspension in water is prepared by A) crushing the solids to a particle size of 6 mm and wet grinding the crushed solids in presence of an aq. soln. of additives to a particle size of 300 micrometre, B) adding before crushing or grinding  $\text{CaCO}_3$ ,  $\text{MgCO}_3$  and/or dolomite in wt. ratio to S of 1.5-3 as 1st **desulphuriser** and C) adding before or during wet grinding 0.04-0.4 wt.%  $\text{MgO}$ ,  $\text{Mg}(\text{OH})_2$ ,  $\text{CaO}$  and/or  $\text{Ca}(\text{OH})_2$  as second **desulphuriser** also having stabilising and anticorrosion

properties, referred to suspension.

The solid is pref. **petroleum coke**. Part of the 1st **desulphuriser** is added before combustion. The amount of 2nd **desulphuriser** is esp. 0.08-0.4 wt.%.

ADVANTAGE - The aq. suspension can be readily transported by pipe and burns with low emission of harmful substances.

ABEQ EP 325309 B UPAB: 19940524

Method for preparing a pumpable, stable and noncorrosive high-concentration aqueous suspension of a solid fuel selected from coal and **petroleum coke**, capable of being burned with a low **SOx** emission, comprising the steps of crushing the solid fuel to a maximum particle-size of 6 mm and wet grinding the crushed solid fuel with an aqueous solution of additives until the resultant wet-ground composition has a maximum particle size of 300 micro m for the solid phase, characterised in that, before crushing or, before wet-grinding, at least an inorganic-carbonate-based sulphur-binding compound, selected from  $\text{CaCO}_3$ ,  $\text{MgCO}_3$  and dolomite is introduced in a molar ratio of from 1.5 to 3 relative to the sulphur contents of said solid fuel, and that during wet grinding, or before, at least an inorganic hydroxide or oxide-based **desulphuriser**, stabiliser, and anticorrosive compound, selected from  $\text{MgO}$ ,  $\text{Mg(OH)}_2$ ,  $\text{CaO}$  and  $\text{Ca(OH)}_2$ , is introduced in an amount of from 0.04% to 0.4% by weight relative to the final aqueous suspension.

Dwg.0/0

FS CPI GMPI

FA AB; DCN

MC CPI: E34-B; E34-D01; E34-D03; H08-E02; H09-G02; H09-H02

DRN 1278-U; 1359-U; 1502-U; 1503-U; 1509-U; 1510-U

CMC UPB 19930924

M3 \*01\* A212 A220 A940 C106 C108 C530 C730 C801 C802 C803 C805 C807  
M411 M782 M903 M904 M910 N163 Q418 Q431 Q508 R024

DCN: R01278-M; R01359-M; R05184-M

M3 \*02\* A212 A220 A940 C101 C108 C550 C730 C801 C802 C803 C804 C805  
C807 M411 M782 M903 M904 M910 N163 Q418 Q431 Q508 R024

DCN: R01502-M; R01503-M; R01509-M; R01510-M

L38 ANSWER 16 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1987-323456 [46] WPIDS

DNC C1987-137863

TI Sulphation roasting process for zinc concentrate - involves introducing slurry contg. pyrite and **coke powder** into **fluidised** bed furnace and introducing sulphur di oxide into local portions.

DC M25

PA (MITV) MITSUBISHI METAL CORP

CYC 1

PI JP 62228435 A 19871007 (198746)\*

5

ADT JP 62228435 A JP 1986-71324 19860331

PRAI JP 1986-71324 19860331

IC C22B001-06; C22B019-02

AB JP 62228435 A UPAB: 19930922

Method includes introducing Zn concentrate slurry contg. pyrite and coke **powder** into a fluidised bed furnace, and introducing **SO2** gas into local portions of the fluidised bed in which density of **SO2** gas is below a predetermined level.

ADVANTAGE - Heat by reaction with coke and pyrite is used for roasting. Sulphation is effected by reaction of pyrite and supply of **SO2** gas.

0/2

FS CPI

FA AB

MC CPI: M25-A; M25-G27

DRN 1674-U

L38 ANSWER 17 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1986-072334 [11] WPIDS

DNN N1986-052557 DNC C1986-030991

TI Nitrogen oxide(s) reducing burning system - involves supplying water, powdery fuel and **desulphurising** agent to prim. burning chamber.

DC J09 Q73

PA (HITF) HITACHI ZOSEN CORP

CYC 1

PI JP 61022107 A 19860130 (198611)\* 4

JP 63067601 B 19881227 (198904)

ADT JP 61022107 A JP 1984-140173 19840705

PRAI JP 1984-140173 19840705

IC F23C011-00

AB JP 61022107 A UPAB: 19930922

In NOx-reducing burning system having a furnace consisting of prim. burning chamber where reductive burning is made and the sec. burning chamber where oxidatible burning is made, provided above or behind the prim. burning chamber, a slurry composed of water and a powdery fuel (e.g., coal, **petroleum coke**, etc.), together with a **desulphurising** agent (e.g., an alkali(ne earth) metal cpd. such as CaCO3, etc.) as needed, is supplied into the prim. burning chamber to cause a water gas shift reaction of the powdery fuel and water. NOx is reduced by the redn. gas so formed and denitrification and **desulphurisation** are brought about concurrently, and unburned portion is completely burned at low temps. in the sec. burning chamber.

USE/ADVANTAGE - This method can effectively and simply burn off **SOx** and NOx in coal, **petroleum coke**, etc., by concurrently attaining denitrification and **desulphurisation** at low temps. without causing corrosion of



furnace.

0/2

FS CPI GMPI

FA AB

MC CPI: J09-C

DRN 1278-U; 1784-S; 1953-S

L38 ANSWER 18 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1986-045069 [07] WPIDS

DNC C1986-018907

TI Moulded fuel prodn. - by mixing petroleum core with wood waste powder, and heating and pressing the mixt..

DC H08 H09

PA (NIMI) NIPPON LIGHT METAL CO

CYC 1

PI JP 60262891 A 19851226 (198607)\* 6

ADT JP 60262891 A JP 1984-116679 19840608

PRAI JP 1984-116679 19840608

IC C10L005-08

AB JP 60262891 A UPAB: 19930922

Method involves mixing 100 pts.wt. petroleum coke or 100 pts.wt. raw material comprising **petroleum coke**

**powder** and semi- or heavy caking coal in the wt. ratio

9:1-5:5 with 15-100 pts.wt. powdered wood waste, heating the mixt.

at 50-80 deg.C, and continuously pressing the mixt. in a roll press under 3000-10000 kg/cm line pressure so that the tar component of the petroleum coke also binds together the wood.

USE/ADVANTAGE - Solid fuel is produced using low sulphur and low vanadium wood and coal material. Since low sulphur materials are used without binder such as water-soluble polymer or petroleum or coal pitch, the content of **sulphur oxides** in the combustion prods. is low.

0/0

FS CPI

FA AB

MC CPI: H09-F01

DRN 1669-U

L38 ANSWER 19 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1985-128119 [21] WPIDS

DNC C1985-055719

TI Prod. of carbonaceous briquettes - from coke, asphaltene binder and inorganic scavenger material.

DC H09

PA (CHAR-I) CHARTERS J E

CYC 1

PI US 4515601 A 19850507 (198521)\* 9

ADT US 4515601 A US 1982-373878 19820503

PRAI US 1982-373878 19820503

IC C10L005-12

AB US 4515601 A UPAB: 19930925

Prod'n. of carbonaceous briquettes comprises (a) obtaining carbonaceous material (I) such as coal, lignit, and/or **petroleum coke** as pulverised fine **particle** material; (b) dry blending the pulverised (I) with a finely divided inorganic sulphur scavenger material selected from alkali metals, alkaline earth carbonates, bicarbonates, metal oxides, hydroxides and salts; (c) mixing an asphaltene binder material of deep solvent, deasphalting below its softening point and providing a ring and ball softening point in the range of 200 - 400 deg.F with the dry mixt. of (I) and the inorganic s scavenger material; and (d) compressing the mixt. in the absence of external heating to form briquettes of 3/8 - 3 inches.

USE/ADVANTAGE - A high S content solid fuel briquette is formed from low cost petroleum refining by-prods. and waste materials which, upon combustion, emits very low amts. of S **oxides** into the atmos.

0/4

FS CPI

FA AB

MC CPI: H09-F

L38 ANSWER 20 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1984-044222 [08] WPIDS

DNC C1984-018499

TI Regeneration of fluid cracking catalyst, etc. - using mixt. of oxygen and carbon di oxide.

DC H01 H04

IN HEGARTY, W P

PA (AIRP) AIR PROD & CHEM INC

CYC 14

PI EP 100531 A 19840215 (198408)\* EN 40

R: AT BE CH DE FR GB IT LU NL SE

JP 59046140 A 19840315 (198417)

AU 8317695 A 19840322 (198419)

BR 8304227 A 19840313 (198421)

CA 1201106 A 19860225 (198613)

JP 02022703 B 19900521 (199024)

ADT EP 100531 A EP 1983-107455 19830728; JP 59046140 A JP 1983-141804 19830802; JP 02022703 B JP 1983-141804 19830802

PRAI US 1982-404676 19820803; US 1984-599856 19840413

REP GB 2081596; GB 2081597; No-SR.Pub; US 2527575; US 3401124; US 4146463

IC B01J008-26; B01J029-38; B01J037-14; B01J038-36; C10B055-10; C10G011-18; C10J003-54; C10K001-04; C10K003-04

AB EP 100531 A UPAB: 19930925

Regeneration of **particulate** matter (esp. FCC catalyst) from a fluidised-bed reactor is effected by burning off carbonaceous material in a fluidised-bed regenerator using a mixt. of N<sub>2</sub>-free O<sub>2</sub> and CO<sub>2</sub>, giving an effluent gas contg. CO, CO<sub>2</sub>, O<sub>2</sub>, **SO<sub>x</sub>**, NO<sub>x</sub> and H<sub>2</sub>O. The effluent gas is then (a) subjected to a high-temp reducing atmos. to decompose NO<sub>x</sub>, (b) contacted with added O<sub>2</sub> to oxidise CO to CO<sub>2</sub>, (c) cooled to partially condense H<sub>2</sub>O and **SO<sub>x</sub>**, and (d) sepd. into a CO<sub>2</sub> stream and a net gas stream. The CO<sub>2</sub> stream is recycled to the regenerator. Also claimed are other process employing different treatment of the effluent gas, and a similar process for reheating and partial gasification of **coke** from a **fluid coker**.

Use of O<sub>2</sub>/CO<sub>2</sub> mixts. instead of air avoids dilution of the effluent gas with N<sub>2</sub>.

O/2

FS CPI

FA AB

MC CPI: H04-B02; H04-F; N06-E

DRN 1066-P; 1066-U; 1423-P; 1738-P; 1779-P; 1779-U; 1784-P; 1953-P

L38 ANSWER 21 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1983-719475 [30] WPIDS

DNC C1983-070162

TI **Petroleum coke** prodn. - by adding alkaline earth metal cpd. to coke asphalt and thermally cracking.

DC H08 M24

PA (SUMH) SUMITOMO HEAVY IND LTD

CYC 1

PI JP 58101190 A 19830616 (198330)\* 3

PRAI JP 1981-198465 19811211

IC C10B057-04; C10C003-00

AB JP 58101190 A UPAB: 19930925

In the prodn. of **petroleum coke** by the thermal cracking of asphalt, the thermal cracking is performed after mixing alkaline earth metal cpd. with the asphalt. Incorporation of (I) improves the reactivity and the adsorptivity of the coke. Higher reactivity is obtd. when the **petroleum coke** is used as reducing agent in direct redn. iron mfr. The amt. of **desulphurising** agent, used is greatly reduced. The **petroleum coke** obtd. is also used as a fuel generating only a small amt. of **SO<sub>x</sub>**.

FS CPI

FA AB

MC CPI: H04-B01; H08-E02; M24-A01; M24-A03

L38 ANSWER 22 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1976-31749X [17] WPIDS

TI Prodn. of low-sulphur coke and elemental sulphur from green coke -

by two-stage calcination and reaction of off-gases from calcination steps.

DC E36 H09

PA (CALI) CHEVRON RES CO

CYC 1

PI US 3950503 A 19760413 (197617)\*

PRAI US 1974-509884 19740927

IC C01B017-06

AB US 3950503 A UPAB: 19930901

A two-stage process for the prodn. of a **desulphurised**, calcined **coke** from green **petroleum coke** comprises (a) calcining and partially **desulphurising** the coke by heating under oxidative conditions at 1000-300 degrees F under reducing conditions of an **SO2**-containing off-gase, (b) calcining the partially **desulphurised** coke at 2000-4000 degrees F reducing conditions with the prodn. of an **H2S**-containing off-gas, and (c) forming elemental sulphur and water by reacting at least part of the off-gas from (a) with at least part of the off-gas from (b). The prefd. condition for steps (a) and (b) are 2000-2500 degrees F and 2500-3000 degrees F respectively, and the processes are controlled so as to produce **SO2** and **H2S** in approx. the stoichiometric amts. necessary to form elemental sulphur. Pref. stage (b) is carried out in an electrothermal resistance furnace.

Coke contg. <2 (pref. <(1) wt. % S is obtained and pollution problems due to the exhaust gases from the calcination process are avoided.

FS CPI

FA AB

MC CPI: E31-F05; E31-N03; H04-A01; H04-B01; H08-E02

CMC UPB 19930924

M3 \*01\* C810 C106 N020 N160 Q411 M720 M411 M902

M3 \*02\* C810 C116 N050 N060 M720 M411 M902

L38 ANSWER 23 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1976-30348X [17] WPIDS

TI Spent kraft boiling lye treatment by coking - in acidic liquid phase and **desulphurisation** of coke with hydrogen, for rapid treatment.

DC F09 H09

PA (TEXC) TEXACO DEV CORP

CYC 5

PI DE 2447634 A 19760415 (197617)\*

SE 7415927 A 19760719 (197632)

FI 7403650 A 19760831 (197639)

GB 1457705 A 19761207 (197650)

FR 2329796 A 19770701 (197731)

PRAI DE 1974-2447634 19741005

IC D21C011-04

AB DE 2447634 A UPAB: 19930901

Treatment of spent kraft boiling lye comprises (a) treating the lye with **SO<sub>2</sub>** in an absorption zone to reduce the pH to  $\geq 7$ , pref. 2-5; (b) **fluid coking** under autogenous pressure, forming coke, gas and an aq. stream; (c) sepg. the coke and the aq. stream; (d) burning the gas to produce **SO<sub>2</sub>**; (e) washing the coke with part of the aq. stream and drying with flue gas; (f) passing H<sub>2</sub> at 371-1093, pref. 538-816 degrees C over the coke, with H<sub>2</sub>S formation; and (g) adding lime and the H<sub>2</sub>S formed to the aq. stream in an absorption zone, to produce new kraft boiling lye. Only 2 hr. treatment with H<sub>2</sub> (at 732 degrees C and 1.05kg/cm<sup>2</sup>) are needed to reduce the S content of the coke from 14 to 2.14% and a total of 92% of the S in the starting material can be recovered as H<sub>2</sub>S for use in the process.

FS CPI

FA AB

MC CPI: F05-A02C; H09-A; H09-X

L38 ANSWER 24 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1974-19258V [10] WPIDS

TI Fast setting cement compsn - incorporating material contg entrapped gas to reduce shrinkage.

DC L02

PA (BABC-I) BABCOCK HN

CYC 1

PI US 3794504 A 19740226 (197410)\*

PRAI US 1969-801781 19690224; US 1974-491317 19740724

IC C04B007-02

AB US 3794504 A UPAB: 19930831

The compsn. which sets in <2 hrs. comprises a type (III), hydraulic cement mixture having a **SO<sub>3</sub>** content <2%, together with sufficient **particulate** gas-contg material to offset shrinkage during setting. The additive pref. has water adsorptive surface and may be activated bauxite, activated alumina, activated carbon, silica gel, delayed **coke** or **fluid coke**. A pref. additive is <10 wt.% of **fluid coke** having a **particle** size below 20 mesh and moisture content <3%. The material is esp. used for highway repairs.

FS CPI

FA AB

MC CPI: L02-C02; L02-C05

L38 ANSWER 25 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1972-52375T [33] WPIDS

TI **Fluid-coking** and gasification process - for producing petroleum distillates and fuel gas from heavy

hydrocarbons.

DC H08  
 PA (ESSO) ESSO RES & ENG CO  
 CYC 6  
 PI DE 2202394 A (197233)\*  
 NL 7200893 A (197233)  
 JP 47015406 A (197236)  
 US 3759676 A (197339)  
 GB 1378023 A 19741218 (197451)  
 CA 968290 A 19750527 (197523)  
 JP 55044792 B 19801114 (198050)  
 PRAI US 1971-108709 19710122  
 IC C10B055-10; C10G009-32; C10J003-66  
 AB DE 2202394 A UPAB: 19930831

In an integrated process, the heaving hydrocarbon, pref. a vacuum or distillation residue, is converted into liquid **petroleum** distillate and **coke** in a **fluidised coking** reactor at 480-600 degrees C. The coke is transferred to a central heat exchanger in a second reactor where it is heated by gas from a lower gasification zone operating at 870-1200 degrees C. The gas is cooled to 650-565 degrees C and the coke is heated to 565-650 degrees C, the velocity of the gas flow being sufficient to carry the coke into the upper part of the reactor, where it is deposited and fed back into the gasification zone and/or into the coking reactor. Excess coke is converted into fuel gas (H<sub>2</sub> + CO) by the admission of steam in the gasification zone, and S in the heavy hydrocarbon is converted to H<sub>2</sub>S, which is easily removed from the gas, instead of SO<sub>2</sub> when the coke is burned.

FS CPI  
 FA AB  
 MC CPI: H04-B01; H04-E04; H05-A

L38 ANSWER 26 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
 AN 1971-38950S [23] WPIDS  
 TI Integrated fluid bed heater/gasifier for - coke and enriched gas prodn.

DC E36 H09  
 PA (ESSO) ESSO RES & ENG CO  
 CYC 7  
 PI DE 2054125 A (197123)\*  
 NL 7016069 A (197123)  
 FR 2069613 A (197149)  
 US 3661543 A (197222)  
 GB 1325171 A (197331)  
 CA 935106 A (197343)  
 JP 49023570 B 19740617 (197428)  
 DE 2054125 B 19770929 (197740)

NL 165714 B 19801214 (198103)  
 PRAI US 1969-880219 19691126  
 IC C10B049-10; C10B057-00; C10J003-16  
 AB DE 2054125 A UPAB: 19930831

In a **fluidised bed coking** process, the usual coke burner in which part of the coke is burnt to provide the heat required, is replaced by an integrated heater and gasifier. This consists of upper and lower **fluidised coke** beds, separated by a grating. Coke is gasified in the lower bed in presence of steam and air or oxygen, and hot gases flow through the upper bed, heating the coke which is re-circulated to the coking reactor to provide heat. The process may be operated to produce coke and gas or gas only.

A sulphur-contg. feed stock may be used, the sulphur being converted to H<sub>2</sub>S and scrubbed from the effluent gas. The fluidised beds consist of inert **particles** instead of coke.

The quality and value of the coke produced is improved and air pollution by **SO<sub>2</sub>** is prevented.

FS CPI

FA AB

MC CPI: E31-A; E31-N; H04-B01; H04-E04

CMC UPB 19930924

M3	*01*	C810	C101	C550	N060	Q417	Q413	M720	M782	R010	M411	M901
M3	*02*	C800	C730	C108	C106	C803	C802	C807	C805	C801	C550	N050 Q417
		M720	M782	R010	M411	M901						
M3	*03*	C810	C106	N020	Q411	M720	M411	M901				
M3	*04*	C101	C550	C810	M210	M220	M225	M226	M231	M250	M261	M262 M263
		M271	M272	M273	M280	M281	M282	M283	M311	M312	M313	M314 M315
		M316	M320	M321	M322	M323	M332	M334	M340	M342	M343	M344 M349
		M351	M352	M353	M361	M362	M363	M371	M372	M373	M381	M382 M383
		M391	M392	M393	M411	M720	M782	M903	N060	Q413	Q417	R010 R011
		R012	R013									
M3	*05*	C106	C108	C550	C730	C800	C801	C802	C803	C805	C807	M210 M220
		M225	M226	M231	M250	M261	M262	M263	M271	M272	M273	M280 M281
		M282	M283	M311	M312	M313	M314	M315	M316	M320	M321	M322 M323
		M332	M334	M340	M342	M343	M344	M349	M351	M352	M353	M361 M362
		M363	M371	M372	M373	M381	M382	M383	M391	M392	M393	M411 M720
		M782	M903	N050	Q417	R010	R011	R012	R013			
M3	*06*	C106	C810	M210	M220	M225	M226	M231	M250	M261	M262	M263 M271
		M272	M273	M280	M281	M282	M283	M311	M312	M313	M314	M315 M316
		M320	M321	M322	M323	M332	M334	M340	M342	M343	M344	M349 M351
		M352	M353	M361	M362	M363	M371	M372	M373	M381	M382	M383 M391
		M392	M393	M411	M720	M903	N020	Q411				

L38 ANSWER 27 OF 27 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1970-18240R [11] WPIDS

TI Thermal decompn of a resin acid (suitably the product - of refining petroleum products with H<sub>2</sub>SO<sub>4</sub>) by coke.

DC H04  
 PA (NORF) NORDDEUT AFFINERIE AG  
 CYC 2  
 PI BE 738896 A (197011)\*  
 DE 1571664 B (197031)  
 PRAI DE 1966-1571664 19661029  
 AB BE 738896 A UPAB: 19930831

Process is carried out in a turbulent bed, maintained at the decomp. temp. containing a major proportion of solid coke **particles** formed from the same decomposition process. The bed is located in a chamber without a grill of increasing cross-section so that each **particle** increase takes place in a zone in which the gas velocity is most favourable for uniform agitation and transmission of heat. The heat for the decomposition is provided by the heat of gas **fluidisation**, while the **coke** is removed from the bed through an overflow.

The temp. of the bed may be regulated depending on the type and quantity of final products. Suitably at 250-450 degrees (pref. 400 degrees C) the decomposition gas is treated for the prepn. of sulphuric acid or liquid **SO2**; at 700-800 degrees C (preferably 750 degrees C) the decomposition gas containing H2S and COS is treated to prepare elemental sulphur and at 800 degrees C or more decomposition gas obtained is freed from CS2.

FS CPI  
 FA AB  
 MC CPI: H04-A05

=> d his 145-

FILE 'REGISTRY' ENTERED AT 12:59:16 ON 05 AUG 2004  
 E MERCURY/CN

L45 1 S E3

FILE 'HCA' ENTERED AT 12:59:27 ON 05 AUG 2004

L46 93330 S L45  
 L47 147336 S (ACT# OR ACTIV?) (2A) (C OR CARBON# OR CHARCOAL#)  
 L48 8 S L6 AND L46  
 L49 10 S L6 AND L47  
 L50 15 S (L48 OR L49) NOT (L39 OR L40)

FILE 'WPIDS' ENTERED AT 13:05:09 ON 05 AUG 2004

L51 36981 S L45 OR MERCURY# OR HG  
 L52 42251 S (ACT# OR ACTIV?) (2A) (C OR CARBON# OR CHARCOAL#)  
 L53 3 S (L11 OR L32) AND L51  
 L54 8 S (L11 OR L32) AND L52  
 L55 7 S (L53 OR L54) NOT L38



FILE 'HCA' ENTERED AT 13:06:48 ON 05 AUG 2004

L56 2 S L20 AND (L46 OR L47)  
L57 17 S (L50 OR L56) NOT (L39 OR L40)

=> d 157 1-17 cbib abs hitstr hitind

L57 ANSWER 1 OF 17 HCA COPYRIGHT 2004 ACS on STN  
140:308397 Removal of **sulfur dioxide** from flue gases *this case*  
using **petroleum coke**. Jia, Charles Q. (Can.).  
U.S. Pat. Appl. Publ. US 2004076570 A1 20040422, 14 pp. (English).  
CODEN: USXXCO. APPLICATION: US 2003-681210 20031009. PRIORITY: CA  
2002-2408858 20021018.

AB **SO2** is removed from flue gases by treating the gas with  
**petroleum coke** at 600-1000° thereby  
reducing **SO2** to elemental sulfur and activating the coke.  
The flue gas can be a smelter gas and may contain NOx, and metal  
species, esp. Hg, which are efficiently removed at that temp.

IT **7446-09-5, Sulfur dioxide**, processes  
(removal of **sulfur dioxide** from flue gases  
using **petroleum coke**)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IT **7439-97-6, Mercury**, processes  
(removal of **sulfur dioxide** from flue gases  
using **petroleum coke**)

RN 7439-97-6 HCA

CN Mercury (8CI, 9CI) (CA INDEX NAME)

Hg

IC ICM C01B017-02

NCL 423244010; 423569000

CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 60

ST flue gas desulfurization **petroleum coke**  
**activated carbon** mercury adsorption

IT Wastewater treatment  
(adsorption; removal of **sulfur dioxide** from  
flue gases using **petroleum coke**)

IT Wastewater treatment  
(decolorization; removal of **sulfur dioxide**

- from flue gases using **petroleum coke**)
- IT Adsorption  
Flue gas desulfurization  
(removal of **sulfur dioxide** from flue gases  
using **petroleum coke**)
- IT **Petroleum coke**  
(removal of **sulfur dioxide** from flue gases  
using **petroleum coke**)
- IT 7440-44-0, **Carbon**, formation (nonpreparative)  
(**activated**, adsorbent; removal of **sulfur  
dioxide** from flue gases using **petroleum  
coke**)
- IT 7704-34-9, **Sulfur**, processes  
(removal of **sulfur dioxide** from flue gases  
using **petroleum coke**)
- IT 7446-09-5, **Sulfur dioxide**, processes  
11104-93-1, **Nitrogen oxide**, processes  
(removal of **sulfur dioxide** from flue gases  
using **petroleum coke**)
- IT 61-73-4, **Methylene blue** 7439-97-6, **Mercury**, processes  
(removal of **sulfur dioxide** from flue gases  
using **petroleum coke**)
- IT 7553-56-2, **Iodine**, processes  
(removal of **sulfur dioxide** from flue gases  
using **petroleum coke**)

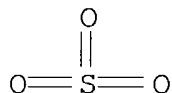
L57 ANSWER 2 OF 17 HCA COPYRIGHT 2004 ACS on STN

138:141481 Mercury removal trends in full-scale ESPs and fabric filters.  
Sjostrom, Sharon; Bustard, Jean; Durham, Michael; Chang, Ramsay  
(Apogee Scientific, Inc., Englewood, CO, 80110, USA). Proceedings -  
U.S. EPA-DOE-EPRI Combined Power Plant Air Pollution Control  
Symposium: The Mega Symposium and the A&WMA Specialty Conference on  
Mercury Emissions: Fate, Effects, and Control, Chicago, IL, United  
States, Aug. 21-23, 2001, Volume 1, 46/1-46/16. Air & Waste  
Management Association: Pittsburgh, Pa. (English) 2001. CODEN:  
69DHKF.

AB In 1999, USEPA initiated an Information Collection Request (ICR) to  
gather data from coal-fired power generating facilities to better  
assess Hg concns. processed (through burning coal), captured, and  
emitted from these facilities. All plants which provide >33% of  
their potential energy output and >25 MW to any utility power  
distribution system for sale were required to report Hg entering the  
system. A statistical sampling of these were identified for stack  
and waste measurements. These data, in conjunction with data  
collected on Department of Energy (DOE) and Elec. Power Research  
Institute (EPRI) programs, provided insight into the overall Hg  
capture in plants and factors affecting that capture. With  
regulations rapidly approaching, the need for full-scale evaluations

to augment available data is necessary. Under a DOE/NETL cooperative agreement, ADA-ES worked in partnership with PG&E National Energy Group, Wisconsin Elec., Alabama Power Company, Ontario Power Generation, and EPRI on a field evaluation program of sorbent injection upstream from existing particulate control devices for Hg control. Included in this program was a task to analyze available data to develop trends and factors affecting the trends for plants without scrubbers for SO<sub>2</sub> control and electrostatic precipitators or fabric filters as particulate control equipment. Data considered include that provided by ICR reports, including temp. and ash, loss on ignition, and flue gas conditioning, when available. Results from recent research and development work conducted by EPRI and results from full-scale evaluations will also be incorporated. A summary of the initial anal. of ICR data and results from DOE and EPRI programs are discussed.

IT 7446-11-9, **Sulfur trioxide**, occurrence  
 (flue gas conditioner; trends of mercury removal from coal-fired power generation flue gas in full-scale electrostatic precipitators and fabric filters)  
 RN 7446-11-9 HCA  
 CN Sulfur trioxide (8CI, 9CI) (CA INDEX NAME)



IT 7439-97-6, **Mercury**, processes  
 (trends of mercury removal from coal-fired power generation flue gas in full-scale electrostatic precipitators and fabric filters)  
 RN 7439-97-6 HCA  
 CN Mercury (8CI, 9CI) (CA INDEX NAME)

Hg

CC 59-4 (Air Pollution and Industrial Hygiene)  
 Section cross-reference(s): 51, 60

IT **Petroleum coke**  
 (power generation from combustion of coal and; trends of mercury removal from coal-fired power generation flue gas in full-scale electrostatic precipitators and fabric filters)  
 IT 7446-11-9, **Sulfur trioxide**, occurrence  
 (flue gas conditioner; trends of mercury removal from coal-fired power generation flue gas in full-scale electrostatic precipitators and fabric filters)  
 IT 7439-97-6, **Mercury**, processes

(trends of mercury removal from coal-fired power generation flue gas in full-scale electrostatic precipitators and fabric filters)

L57 ANSWER 3 OF 17 HCA COPYRIGHT 2004 ACS on STN

137:10053 Recovery and recycling of **sulphur dioxide**

from flue gases. Savu, A.; Drago, L.; Girjoab, M.; Barbu, M. (S.C. Icpet Cercetare S.A., Bucharest, 74 369, Rom.). Journal of Environmental Protection and Ecology, 2(4), 996-999 (English) 2001. CODEN: JEPECE. ISSN: 1311-5065. Publisher: SciBulCom Ltd..

AB **SO2** removal from flue gas using conventional methods requires high sorbent quantities; consequently, high quantities of byproducts are generated. A more attractive technol. is being researched to recover **SO2** from flue gas by adsorption followed by a desorption process. **SO2** is recovered and used for other purposes, e.g., H2SO4 prodn. Adsorbents such as **petroleum coke**, active **coke**, wood tar, and active **C** have been lab. tested. Flue gas **SO2** adsorption was tested in fixed- and fluidized-beds. In the next stage, **activated C** was tested in a fluidized-bed column with very good results: increased **activated C** retention capacity for **SO2** and decreased in-column pressure loss. **SO2** removal efficiency was >90% in flue gas with a high **SO2** content (8000 ppm).

IT 7446-09-5P, **Sulfur dioxide**, processes  
(recovery and recycling of **sulfur dioxide**  
from flue gas following adsorption)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 51

ST flue gas desulfurization **activated carbon**  
adsorption; **sulfur dioxide** removal recovery  
**activated carbon** adsorption

IT Adsorption  
Flue gas desulfurization  
(recovery and recycling of **sulfur dioxide**  
from flue gas following adsorption)

IT Coke

**Petroleum coke**

Wood tar

(sorbent; recovery and recycling of **sulfur**  
**dioxide** from flue gas following adsorption)

IT 7440-44-0, **Carbon**, uses

(**activated**; sorbent; recovery and recycling of **sulfur dioxide** from flue gas following adsorption)

IT 7664-93-9P, Sulfuric acid, preparation  
(recovered **sulfur dioxide** for; recovery and recycling of **sulfur dioxide** from flue gas following adsorption)

IT 7446-09-5P, **Sulfur dioxide**, processes  
(recovery and recycling of **sulfur dioxide** from flue gas following adsorption)

L57 ANSWER 4 OF 17 HCA COPYRIGHT 2004 ACS on STN

134:75339 Treatment of flue gases from rotary cement kiln fired with secondary fuels. Nolf, Henry (Fr.). Techniques de l'Industrie Minerale (7), 62-65 (French) 2000. CODEN: TIMIFG. ISSN: 1296-9281. Publisher: Societe de l'Industrie Minerale.

AB A review with no refs. Nowadays, the cement industry utilizes as much as possible substitution fuels cheaper than the conventional ones, such as **petroleum coke, coke** washing plant sludge, used tires, plastics, etc. The kiln exhaust gases should not exceed the max. concn. levels for dust and pollutants required by local and European authorities. To remove dust, electrostatic precipitators and bag filters are the most commonly utilized, the bag filter being less temp. resistant than the electrostatic precipitator. Pollutant gases are: - Nitrogen oxides, generated at temps. higher than 1200°; they are neutralized with ammonia in a catalyst reactor made of several modules; - **SO2**, HCl, HF are neutralized with lime injection in exhaust gases in a reactor, the salt particles thus produced being recovered in the subsequent bag filter; - Dioxins and heavy metals are neutralized in a reactor combined with a bag filter in which **active carbon** or another reagent is injected.

CC 59-0 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 58

L57 ANSWER 5 OF 17 HCA COPYRIGHT 2004 ACS on STN

134:8419 The environmental quality of fly ashes from co-combustion. Lamers, F. J. M.; Beerlage, M.; Van den Berg, J. W. (KEMA Nederland B. V., Arnhem, 6800 ET, Neth.). Waste Management Series, 1(Waste Materials in Construction, WASCON 2000), 916-926 (English) 2000. CODEN: WMSAAA. Publisher: Pergamon Press.

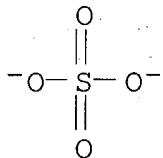
AB In the Netherlands the government allows the co-combustion of max. 10% of secondary fuels together with coal. To show whether the quality of fly ashes is affected by co-combustion, a broad research program was performed in which both the tech. and the environmental quality of concrete with fly ashes from co-combustion were evaluated in comparison to the quality of concrete with ref. fly ashes. In

the research program fly ashes from co-combustion of sewage sludge, paper sludge, pet cokes, phosphorous gas, waste wood and a type of liq. hydrocarbon were evaluated. Both the tech. and the environmental quality of most ashes from co-combustion were shown to be comparable to that of regular fly ashes. This paper reports on the environmental quality of fly ashes from co-combustion; the tech. quality is reported elsewhere. The leaching behavior of concrete with fly ashes from co-combustion, is diffusion controlled. The components that were potentially introduced because of co-combustion did not lead to increase of leaching. As a result of the outcomes of the tech. research program the Dutch regulations for fly ash as a filler or part of the binder were adjusted to make utilization of fly ashes from co-combustion possible. Com. operation of co combustion of several secondary fuels is running now at most of the Dutch coal fired power plants.

IT 7439-97-6, Mercury, occurrence 14808-79-8,  
Sulfate, occurrence  
(leaching from co-combustion fly ash)  
RN 7439-97-6 HCA  
CN Mercury (8CI, 9CI) (CA INDEX NAME)

Hg

RN 14808-79-8 HCA  
CN Sulfate (7CI, 8CI, 9CI) (CA INDEX NAME)



CC 59-2 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 43, 51, 58, 60  
IT Coal, uses

**Petroleum coke**

(environmental quality of fly ashes from co-combustion of various wastes with hard coal)

IT 7439-92-1, Lead, occurrence 7439-97-6, Mercury, occurrence  
7439-98-7, Molybdenum, occurrence 7440-02-0, Nickel, occurrence  
7440-31-5, Tin, occurrence 7440-36-0, Antimony, occurrence  
7440-38-2, Arsenic, occurrence 7440-39-3, Barium, occurrence  
7440-43-9, Cadmium, occurrence 7440-47-3, Chromium, occurrence  
7440-50-8, Copper, occurrence 7440-62-2, Vanadium, occurrence  
7440-66-6, Zinc, occurrence 7782-49-2, Selenium, occurrence  
14808-79-8, Sulfate, occurrence

(leaching from co-combustion fly ash)

L57 ANSWER 6 OF 17 HCA COPYRIGHT 2004 ACS on STN

133:225338 Production of new biomass/waste-containing solid fuels.

Akers, David; Shirey, Glenn; Zitron, Zalman; Nowak, Michael (CQ Inc., USA). Proceedings of the International Technical Conference on Coal Utilization & Fuel Systems, 25th, 199-204 (English) 2000. CODEN: PTCSFT. Publisher: Coal & Slurry Technology Association.

AB The elec. utility industry is interested in the use of biomass and waste byproducts as fuel to reduce both emissions and fuel costs. In addn. to these benefits, utilities also recognize the business advantage of consuming the waste byproducts of customers both to retain customers and to improve the public image of the industry. Unfortunately, biomass and waste byproducts can be troublesome fuels because of low bulk d., high moisture content, variable compn., handling and feeding problems, and inadequate information about combustion and emission characteristics. One method of addressing these issues is to produce composite fuels composed of a pelletized mixt. of biomass and other constituents. However for composite fuels to be extensively used in the US, esp. in the steam market, a low cost method of producing these fuels must be developed. Also, std. formulations of biomass and coal (possibly including waste) with broad application to US boilers must be identified. In addn. to acceptable cost, these std. formulations can provide environmental benefits relative to coal. The Department of Energy along with the Elec. Power Research Institute and various industry partners has funded CQ Inc. to develop both a dewatering/pelletizing die and three std. formulations of biomass, coal and waste byproducts.

IT 7439-97-6, Mercury, occurrence 7446-11-9,

**Sulfur trioxide**, occurrence

(biomass and waste-contg. coal composites as solid fuels)

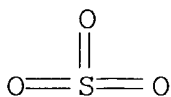
RN 7439-97-6 HCA

CN Mercury (8CI, 9CI) (CA INDEX NAME)

Hg

RN 7446-11-9 HCA

CN Sulfur trioxide (8CI, 9CI) (CA INDEX NAME)



CC 51-19 (Fossil Fuels, Derivatives, and Related Products)

Section cross-reference(s): 11, 38, 43, 59, 60

IT Coal, uses

**Petroleum coke**

(biomass and waste-contg. coal composites as solid fuels)

IT 1305-78-8, Calcia, occurrence 1309-37-1, Ferric oxide, occurrence  
1309-48-4, Magnesia, occurrence 1313-59-3, Sodium oxide,  
occurrence 1314-56-3, Phosphorus pentoxide, occurrence  
1344-28-1, Alumina, occurrence 7439-92-1, Lead, occurrence  
7439-96-5, Manganese, occurrence **7439-97-6, Mercury,**  
occurrence 7440-02-0, Nickel, occurrence 7440-38-2, Arsenic,  
occurrence 7440-41-7, Beryllium, occurrence 7440-43-9, Cadmium,  
occurrence 7440-47-3, Chromium, occurrence 7440-48-4, Cobalt,  
occurrence 7440-50-8, Copper, occurrence 7440-66-6, Zinc,  
occurrence **7446-11-9, Sulfur trioxide,**  
occurrence 7631-86-9, Silica, occurrence 7782-49-2, Selenium,  
occurrence 12136-45-7, Potassium oxide, occurrence 13463-67-7,  
Titania, occurrence

(biomass and waste-contg. coal composites as solid fuels)

L57 ANSWER 7 OF 17 HCA COPYRIGHT 2004 ACS on STN

132:182955 Production and use of a premium fuel grade **petroleum coke**. Etter, Roger (USA). PCT Int. Appl. WO 2000010914 A1  
20000302, 190 pp. DESIGNATED STATES: W: AE, AL, AM, AT, AU, AZ,  
BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD,  
GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK,  
LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU,  
SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA,  
ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG,  
CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML,  
MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2.  
APPLICATION: WO 1999-US19091 19990820. PRIORITY: US 1998-137283  
19980820.

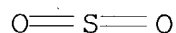
AB A premium fuel-grade **petroleum coke** is produced  
by **petroleum coking** where the coking process  
parameters are controlled to consistently produce **petroleum coke**  
within a predetd. range for volatile combustible  
material (VCM) content. The method comprises (a) obtaining a coke  
precursor material from crude oil contg. volatile org. components;  
and (b) subjecting the precursor to thermal cracking for sufficient  
time and at sufficient temp. and under sufficient pressure to  
produce a coke product having volatile combustible materials (VCMs)  
of 13-50 wt.%. Most preferably, the volatile combustible materials  
in the coke product comprise 15-30 wt.%. Methods are described for  
altering the coke cryst. structure, improving the quality of the  
coke VCM, and reducing the concn. of coke contaminants. Fuels made  
from the coke product and methods of producing energy through the  
combustion of such fuels are also included. Environmental control  
techniques are developed to take optimal advantage of the unique  
characteristics of this upgraded **petroleum coke**.



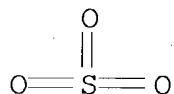
IT 7439-97-6D, Mercury, compds., processes 7446-09-5,  
Sulfur dioxide, processes 7446-11-9,  
Sulfur trioxide, processes  
(prodn. and use of premium fuel grade **petroleum**  
coke)  
RN 7439-97-6 HCA  
CN Mercury (8CI, 9CI) (CA INDEX NAME)

Hg

RN 7446-09-5 HCA  
CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



RN 7446-11-9 HCA  
CN Sulfur trioxide (8CI, 9CI) (CA INDEX NAME)



IC ICM C01B017-22  
ICS C10G009-14; C10L001-10; C10L005-00  
CC 51-9 (Fossil Fuels, Derivatives, and Related Products)  
Section cross-reference(s): 55, 56, 59, 60  
ST **petroleum coke** prodn delayed coking; coke prodn  
premium fuel grade; blast furnace coke prodn delayed coking;  
metallurgical coke prodn delayed coking; calcined coke prodn delayed  
coking  
IT Coke  
(blast-furnace; prodn. and use of premium fuel grade  
**petroleum coke**)  
IT Coke  
(calcined; prodn. and use of premium fuel grade **petroleum**  
**coke**)  
IT Coking  
(delayed; prodn. and use of premium fuel grade **petroleum**  
**coke**)  
IT Ashes (residues)  
(fly; prodn. and use of premium fuel grade **petroleum**  
**coke**)  
IT Petroleum, uses  
(heavy; prodn. and use of premium fuel grade **petroleum**  
**coke**)

- IT Coke  
(metallurgical; prodn. and use of premium fuel grade **petroleum coke**)
- IT Absorbents  
Cyclone separators  
Electrostatic precipitation apparatus  
Filters  
Flue gas desulfurization  
Flue gases  
Oil sand  
Thermal decomposition  
Waste plastics  
Wood waste  
(prodn. and use of premium fuel grade **petroleum coke**)
- IT Coke  
**Petroleum coke**  
(prodn. and use of premium fuel grade **petroleum coke**)
- IT Coal, uses  
Hydrocarbon oils  
(prodn. and use of premium fuel grade **petroleum coke**)
- IT Salts, processes  
(prodn. and use of premium fuel grade **petroleum coke**)
- IT Heavy metals  
(prodn. and use of premium fuel grade **petroleum coke**)
- IT Hydrocarbons, processes  
(unburnt; prodn. and use of premium fuel grade **petroleum coke**)
- IT Scrubbers  
(wet; prodn. and use of premium fuel grade **petroleum coke**)
- IT 7429-90-5P, Aluminum, preparation 12597-69-2P, Steel, preparation  
(manufg., coke for; prodn. and use of premium fuel grade **petroleum coke**)
- IT 1333-74-0, Hydrogen, uses  
(prodn. and use of premium fuel grade **petroleum coke**)
- IT 7440-23-5, Sodium, processes  
(prodn. and use of premium fuel grade **petroleum coke**)
- IT 124-38-9, Carbon dioxide, processes 132-64-9D, Dibenzofuran, chloro derivs. 262-12-4D, Dibenzo[b,e][1,4]dioxin, chloro derivs. 7439-97-6D, Mercury, compds., processes 7446-09-5, Sulfur dioxide, processes 7446-11-9,

**Sulfur trioxide**, processes 11104-93-1, Nitrogen  
oxide, processes  
(prodn. and use of premium fuel grade **petroleum**  
**coke**)

L57 ANSWER 8 OF 17 HCA COPYRIGHT 2004 ACS on STN

129:43097 Influence of an igneous intrusion on the inorganic  
geochemistry of a bituminous coal from Pitkin County, Colorado.  
Finkelman, Robert B.; Bostick, Neely H.; Dulong, Frank T.; Senftle,  
Frank E.; Thorpe, Arthur N. (U.S. Geological Survey, Reston, VA,  
22092, USA). International Journal of Coal Geology, 36(3-4),  
223-241 (English) 1998. CODEN: IJCGDE. ISSN: 0166-5162.  
Publisher: Elsevier Science B.V..

AB Although the effects of igneous dikes on the org. matter in coal  
have been obsd. at many localities there is virtually no information  
on the effects of the intrusions on the inorg. constituents in the  
coal. Such a study may help to elucidate the behavior of trace  
elements during in situ gasification of coal and may provide  
insights into the resource potential of coal and coke affected by  
the intrusion. To det. the effects of an igneous intrusion on the  
inorg. chem. of a coal we used a series of 11 samples of coal and  
natural coke that had been collected at intervals from 3 to 106 cm  
from a dike that intruded the bituminous Dutch Creek coal in Pitkin,  
CO. The samples were chem. analyzed for 66 elements. SEM-EDX and  
X-ray diffraction anal. were performed on selected samples.  
Volatile elements such as F, Cl, Hg, and Se are not depleted in the  
samples (coke and coal) nearest the dike that were exposed to the  
highest temps. Their presence in these samples is likely due to  
secondary enrichment following volatilization of the elements  
inherent in the coal. Equilibration with ground water may account  
for the uniform distribution of Na, B, and Cl. High concns. of Ca,  
Mg, Fe, Mn, Sr, and CO<sub>2</sub> in the coke region are attributed to the  
reaction of CO and CO<sub>2</sub> generated during the coking of the coal with  
fluids from the intrusion, resulting in the pptn. of carbonates.  
Similarly, pptn. of sulfide minerals in the coke zone may account  
for the relatively high concns. of Ag, Hg, Cu, Zn, and Fe. Most  
elements are concd. at the juncture of the **fluidized**  
**coke** and the thermally metamorphosed coal. Many of the  
elements enriched in this region (for example, Ga, Ge, Mo, Rb, U,  
La, Ce, Al, K, and Si) may have been adsorbed on either the clays or  
the org. matter or on both.

IT 7439-97-6, Mercury, properties 7446-11-9,  
**Sulfur trioxide**, properties  
(igneous intrusion effect on inorg. geochem. of bituminous coal  
from Pitkin County, Colorado)

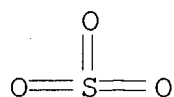
RN 7439-97-6 HCA

CN Mercury (8CI, 9CI) (CA INDEX NAME)

Hg

RN 7446-11-9 HCA

CN Sulfur trioxide (8CI, 9CI) (CA INDEX NAME)



CC 51-15 (Fossil Fuels, Derivatives, and Related Products)

Section cross-reference(s): 53

IT 124-38-9, Carbon dioxide, properties 1305-78-8, Calcia, properties  
 1309-36-0, Pyrite, properties 1309-37-1, Iron oxide Fe<sub>2</sub>O<sub>3</sub>,  
 properties 1309-48-4, Magnesia, properties 1313-59-3, Sodium  
 oxide, properties 1314-56-3, Phosphorus pentoxide, properties  
 1317-60-8, Hematite, properties 1318-74-7, Kaolinite, properties  
 1344-28-1, Alumina, properties 7429-90-5, Aluminum, properties  
 7429-91-6, Dysprosium, properties 7439-89-6, Iron, properties  
 7439-91-0, Lanthanum, properties 7439-92-1, Lead, properties  
 7439-93-2, Lithium, properties 7439-95-4, Magnesium, properties  
 7439-96-5, Manganese, properties **7439-97-6, Mercury,**  
 properties 7439-98-7, Molybdenum, properties 7440-00-8,  
 Neodymium, properties 7440-02-0, Nickel, properties 7440-03-1,  
 Niobium, properties 7440-09-7, Potassium, properties 7440-10-0,  
 Praseodymium, properties 7440-17-7, Rubidium, properties  
 7440-19-9, Samarium, properties 7440-20-2, Scandium, properties  
 7440-21-3, Silicon, properties 7440-22-4, Silver, properties  
 7440-23-5, Sodium, properties 7440-24-6, Strontium, properties  
 7440-25-7, Tantalum, properties 7440-27-9, Terbium, properties  
 7440-28-0, Thallium, properties 7440-29-1, Thorium, properties  
 7440-30-4, Thulium, properties 7440-31-5, Tin, properties  
 7440-32-6, Titanium, properties 7440-33-7, Tungsten, properties  
 7440-36-0, Antimony, properties 7440-38-2, Arsenic, properties  
 7440-39-3, Barium, properties 7440-41-7, Beryllium, properties  
 7440-42-8, Boron, properties 7440-43-9, Cadmium, properties  
 7440-45-1, Cerium, properties 7440-46-2, Cesium, properties  
 7440-47-3, Chromium, properties 7440-48-4, Cobalt, properties  
 7440-50-8, Copper, properties 7440-52-0, Erbium, properties  
 7440-53-1, Europium, properties 7440-54-2, Gadolinium, properties  
 7440-55-3, Gallium, properties 7440-56-4, Germanium, properties  
 7440-57-5, Gold, properties 7440-58-6, Hafnium, properties  
 7440-60-0, Holmium, properties 7440-61-1, Uranium, properties  
 7440-62-2, Vanadium, properties 7440-64-4, Ytterbium, properties  
 7440-65-5, Yttrium, properties 7440-66-6, Zinc, properties  
 7440-67-7, Zirconium, properties 7440-69-9, Bismuth, properties  
 7440-70-2, Calcium, properties **7446-11-9, Sulfur**

trioxide, properties 7631-86-9, Silica, properties  
 7704-34-9, Sulfur, properties 7723-14-0, Phosphorus, properties  
 7782-41-4, Fluorine, properties 7782-49-2, Selenium, properties  
 7782-50-5, Chlorine, properties 12136-45-7, Potassium oxide,  
 properties 12172-74-6, Ankerite 12173-60-3, Illite 13397-26-7,  
 Calcite, properties 13463-67-7, Titania, properties 13494-80-9,  
 Tellurium, properties 14476-16-5, Siderite 14808-60-7, Quartz,  
 properties 16389-88-1, Dolomite, properties  
 (igneous intrusion effect on inorg. geochem. of bituminous coal  
 from Pitkin County, Colorado)

L57 ANSWER 9 OF 17 HCA COPYRIGHT 2004 ACS on STN

127:297593 Recycling of scrap tires and other wastes in cement  
 manufacture. Winkler, H. D. (Landesumweltamt Nord-Rhein-Westfalen,  
 Essen, D-45023, Germany). Materialien - Landesumweltamt  
 Nordrhein-Westfalen, 42 (Kreislaufwirtschaft und Abfallverwertung in  
 Thermischen Prozessen), 95-111 (German) 1997. CODEN: MLNWF7. ISSN:  
 0947-5206. Publisher: Landesumweltamt Nordrhein-Westfalen.

AB The use of scrap tires and other wastes in cement manuf., as  
 potential alternative fuels to coal, was examd., esp. with respect  
 to their attractiveness in replacing coal with more favorable (or at  
 least no change in) emissions of trace metals. The combustion  
 process in cement manuf. has shown that a large portion of the  
 non-volatile trace metals and elements eventually are incorporated  
 into the cement matrix. Semi-volatile elements condense and are  
 removed in the electrostatic filters. Highly volatile materials  
 (e.g., As, Pb, Cd, etc.) can be removed later in the process,  
 typically in an adsorption column. Combustion of these wastes is  
 also characterized by low emissions of polycyclic arom.  
 hydrocarbons, PCBs, chlorinated methyldiphenyls, polychlorinated  
 benzenes, polychlorinated phenols, and polychlorinated benzodioxins  
 and benzofurans.

IT 7439-97-6, Mercury, occurrence 7446-09-5,  
 Sulfur dioxide, occurrence

(emissions; use of scrap tires and other wastes as candidate  
 alternative fuels to coal in cement manuf.)

RN 7439-97-6 HCA

CN Mercury (8CI, 9CI) (CA INDEX NAME)

Hg

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

CC 58-1 (Cement, Concrete, and Related Building Materials)  
Section cross-reference(s): 39, 59, 60

IT Coke

**Petroleum coke**

(secondary fuel, combustion of; use of scrap tires and other wastes as candidate alternative fuels to coal in cement manuf.)

IT 71-43-2D, Benzene, chloro derivs., occurrence 92-52-4D,  
1,1'-Biphenyl, chloro derivs., occurrence 108-95-2D, Phenol,  
chloro derivs., occurrence 132-64-9D, Dibenzofuran, chloro derivs.  
262-12-4D, Dibenzo[b,e][1,4]dioxin, chloro derivs. 7439-92-1,  
Lead, occurrence **7439-97-6**, Mercury, occurrence  
7440-02-0, Nickel, occurrence 7440-28-0, Thallium, occurrence  
7440-31-5, Tin, occurrence 7440-36-0, Antimony, occurrence  
7440-38-2, Arsenic, occurrence 7440-41-7, Beryllium, occurrence  
7440-43-9, Cadmium, occurrence 7440-47-3, Chromium, occurrence  
7440-48-4, Cobalt, occurrence 7440-50-8, Copper, occurrence  
7440-62-2, Vanadium, occurrence 7440-66-6, Zinc, occurrence  
**7446-09-5, Sulfur dioxide**, occurrence  
7704-34-9, Sulfur, occurrence 7782-41-4, Fluorine, occurrence  
7782-49-2, Selenium, occurrence 7782-50-5, Chlorine, occurrence  
11104-93-1, Nitrogen oxide (NOx), occurrence 13494-80-9,  
Tellurium, occurrence 122808-61-1  
(emissions; use of scrap tires and other wastes as candidate  
alternative fuels to coal in cement manuf.)

L57 ANSWER 10 OF 17 HCA COPYRIGHT 2004 ACS on STN

110:13061 Processing of residues of fluidized-bed gasification of  
brown-coal low-temperature coke. Moebius, R.; Szargan, P.; Engel,  
S.; Schulze, H.; Heschel, W.; Winkler, F. (Leuna, Ger. Dem. Rep.).  
Freiberger Forschungshefte A, 777, 102-13 (German) 1988. CODEN:  
FFRAA7. ISSN: 0071-9390.

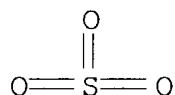
AB Adsorbents for wastewater treatment are obtained by screening the  
ashes from the gasification of lignite cokes in Winkler generator.  
Products of a higher quality are obtained by subjecting these  
products to d.-sorting, extn. with HCl, and steam activation. The  
final product of this treatment is a high-quality **activated**  
**C** for the purifn. of drinking water.

IT **7446-11-9, Sulfur trioxide**, uses and  
miscellaneous

(removal of, from ashes of fluidized-bed gasification of lignite  
coke, by d. sorting and hydrochloric acid extn. and steam  
activation, adsorbent manuf. in relation to)

RN 7446-11-9 HCA

CN Sulfur trioxide (8CI, 9CI) (CA INDEX NAME)



- CC 60-3 (Waste Treatment and Disposal)  
Section cross-reference(s): 51, 61
- ST lignite coke ash adsorbent application; drinking water purifn  
**activated carbon**; adsorption wastewater treatment  
**activated carbon**
- IT Water purification  
(adsorption, of drinking water, **activated carbon** manuf. for, from ashes of fluidized-bed gasification of lignite coke)
- IT Ashes (residues)  
(**coke**, from **fluidized-bed** gasification of lignite, screening and d. sorting and hydrochloric acid extn. and steam activation of, in adsorbent manuf.)
- IT 1305-78-8, Calcium oxide, uses and miscellaneous 1309-37-1, Ferric oxide, uses and miscellaneous **7446-11-9, Sulfur trioxide**, uses and miscellaneous 7631-86-9, Silica, uses and miscellaneous  
(removal of, from ashes of fluidized-bed gasification of lignite coke, by d. sorting and hydrochloric acid extn. and steam activation, adsorbent manuf. in relation to)
- IT 7440-44-0  
(water purification, adsorption, of drinking water, **activated carbon** manuf. for, from ashes of fluidized-bed gasification of lignite coke)
- L57. ANSWER 11 OF 17 HCA COPYRIGHT 2004 ACS on STN  
105:83435 Fuel additives for corrosion prevention in boilers. Harada, Yoshio; Ueyoshi, Haruo (Mitsubishi Heavy Industries, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 61079787 A2 19860423 Showa, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1984-200683 19840927.
- AB Mn compds. are added to fuels to prevent sulfurization corrosion in boilers by combustion atms. contg. S compds. and unburned C. Optionally, Al and Si compds. are added. Thus, 2 parts MnO<sub>2</sub> and 1 part simulated **petroleum coke** ash (Na<sub>2</sub>SO<sub>4</sub> 80, V<sub>2</sub>O<sub>5</sub> 15, and **activated C** 5%) were used for a corrosion test on STB 42 in an atm. of O<sub>2</sub> 4, SO<sub>4</sub> 1, CO<sub>2</sub> 12, and N<sub>2</sub> 82% for 50 h at 650°. Corrosion loss on specimen was only 32% of that without MnO<sub>2</sub>, or 68% when using Al<sub>2</sub>O<sub>3</sub> instead of MnO<sub>2</sub>.
- IC ICM C23F011-00
- CC 55-10 (Ferrous Metals and Alloys)  
Section cross-reference(s): 51

L57 ANSWER 12 OF 17 HCA COPYRIGHT 2004 ACS on STN

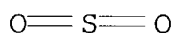
104:39049 Removal of acid components and nitrogen oxides from flue gases. Heyn, Klaus (STEAG A.-G., Fed. Rep. Ger.). Ger. Offen. DE 3412955 A1 19851024, 9 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1984-3412955 19840406.

AB Acidic components and NO<sub>x</sub> are removed from flue gases by scrubbing with a basic absorbent soln. The gases are then treated with an oxidant, e.g., O<sub>3</sub>, scrubbed a 2nd time, and passed over an oxidizable solid such as anthracite, activated **coke**, **petroleum coke**, and/or **activated C**. Suitable scrubbing solns. contain CaCO<sub>3</sub>, CaO, Ca(OH)<sub>2</sub>, MgO, Na<sub>2</sub>O, NaOH, or their mixts. or aq. NH<sub>3</sub> solns. The method removes excess oxidant.

IT **7446-09-5**, uses and miscellaneous  
(removal of nitrogen oxide and, from flue gases by scrubbing, oxidn., excess oxidant removal in)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



IC ICM B01D053-34

CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): 51

IT Oxidizing agents  
(removal of excess, in flue gas scrubbing, **activated carbon** in)

IT **Charcoal**  
(**activated**, in removal of excess oxidant from flue gases during scrubbing)

IT **Coke**  
(**petroleum**, activated, in removal of excess oxidant from flue gases during scrubbing)

IT **7446-09-5**, uses and miscellaneous  
(removal of nitrogen oxide and, from flue gases by scrubbing, oxidn., excess oxidant removal in)

L57 ANSWER 13 OF 17 HCA COPYRIGHT 2004 ACS on STN

102:28296 Energy from waste in a cement kiln. Robb, A. F. (Canada Cem. Lafarge Ltd., Woodstock, ON, Can.). Proceedings of the Ontario Industrial Waste Conference, 31st, 195-229 (English) 1984. CODEN: OIWPAR. ISSN: 0078-4893.

AB A project in the use of selected liq. industrial wastes as a supplementary fuel in cement kilns is described. A 3-mo test burn is completed, and if successful at the environmental assessment hearing the waste will be used as fuel to supply ≤40% of the



heat requirements of 2 kilns. The selected waste is mainly solvents from automotive, paint and coating, ink and printing, cosmetics, and photog. industries. During the test firing .apprx.260,000 gal of liq. waste was used along with delayed **petroleum coke** which was the primary fuel. The liq. waste replaced natural gas in the kiln. There are generally no significant increases in the emissions from the kiln stack and cooler stack during the use of liq. waste fuel, nor is there any adverse effects on the plant products.

IT 7446-09-5, uses and miscellaneous  
     (emission of, from cement kiln stack using liq. waste as partial fuel)  
 RN 7446-09-5 HCA  
 CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)

O=S=O

IT 7439-97-6, uses and miscellaneous  
     (in waste dust of cement kilns fueled partly with liq. industrial wastes)  
 RN 7439-97-6 HCA  
 CN Mercury (8CI, 9CI) (CA INDEX NAME)

Hg

CC 52-1 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 58, 59, 60  
 IT 110-00-9 828-00-2 1746-01-6 7439-92-1, uses and miscellaneous  
 7440-39-3, uses and miscellaneous 7440-43-9, uses and  
 miscellaneous 7440-47-3, uses and miscellaneous 7440-50-8, uses  
 and miscellaneous 7440-66-6, uses and miscellaneous 7440-70-2,  
 uses and miscellaneous 7446-09-5, uses and miscellaneous  
 7782-50-5, uses and miscellaneous 11104-93-1, uses and  
 miscellaneous 16887-00-6, uses and miscellaneous  
     (emission of, from cement kiln stack using liq. waste as partial fuel)  
 IT 57-12-5, uses and miscellaneous 60-57-1 5103-71-9  
 7439-97-6, uses and miscellaneous 7440-22-4, uses and  
 miscellaneous 7440-38-2, uses and miscellaneous 7440-42-8, uses  
 and miscellaneous 7440-61-1, uses and miscellaneous 7782-49-2,  
 uses and miscellaneous 11097-69-1 16984-48-8, uses and  
 miscellaneous  
     (in waste dust of cement kilns fueled partly with liq. industrial wastes)

93:191345 **Sulfur oxide**-sorbing agents for treatment of waste gases. (Ishikawajima-Harima Heavy Industries Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 55073324 19800603 Showa, 3 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1978-148115 19781130.

AB **SOx**-contg. flue gases, e.g., from the combustion of coal or fuel oil, are desulfurized by sorption with a V-contg. coke obtained from the residue from the pyrolysis of heavy petroleum. Thus, a flue gas (130°) contg. 2000 ppm **SOx** was contacted with coke contg. Na 0.24, V 0.39, Ni 0.15, and Fe 0.1%. After 40 min of operation, the **SOx** removal rate was still 98%; when **activated C** was used as the sorbent, the rate declined from 80 (initial) to 35%.

IC B01D053-34; B01D053-02

CC 59-2 (Air Pollution and Industrial Hygiene)

Section cross-reference(s): 51

ST vanadium contg coke gas desulfurization; sorbent flue gas desulfurization; **sulfur oxide** removal flue gas

IT Flue gases

(**sulfur oxide** removal from, absorbent for, vanadium-contg. **petroleum coke** as)

IT Sorbents

(vanadium-contg. **petroleum coke**, for **sulfur oxides** in flue gases)

IT **Coke**

(**petroleum**, vanadium-contg., as absorbent for **sulfur oxide** in flue gases)

IT 7440-62-2, uses and miscellaneous

(**petroleum coke** contg., as absorbent for **sulfur oxides** in flue gases)

IT 12624-32-7

(removal of, from flue gases, absorbent for, vanadium-contg. **coke** from heavy **petroleum** pyrolysis as)

L57 ANSWER 15 OF 17 HCA COPYRIGHT 2004 ACS on STN

83:62841 Starting materials for **active carbon**.

Yokogawa, Akira; Mitooka, Mitsuyuki; Shima, Kenji (Maruzen Oil Co., Ltd.). Ger. Offen. DE 2346230 19740321, 43 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1973-2346230 19730913.

AB The initial materials for the prodn. of **active carbon** are prepd. from high-b.p. petroleum products (bitumen, catalytic or thermal cracking residues, heavy fractions, tar, **petroleum coke**, etc.) by treating them in a reaction medium (halogenated low-aliph. compd.) with a sulfonating agent (H<sub>2</sub>SO<sub>4</sub>, **SO<sub>3</sub>**, etc.) to carbonization, followed by steam activation. Thus, bitumen is dissolved in 1,1,2-trichloroethylene and dild. with 96% H<sub>2</sub>SO<sub>4</sub>; the mixt. is heated to 100° for 3 hr, after which the product is poured into water, filtered, washed and dried. The yield is 131 wt. % with

respect to the bitumen and consists of a coarse granulate with a bulk d. of 0.609 g/cm<sup>3</sup>. Steam activation for 1 hr at 850° produces **active carbon** with a sp. surface of 1700 m<sup>2</sup>/g, a methylene blue adsorption of 430 mg/g, a bulk d. of 0.398 g/cm<sup>3</sup> and yield of 32.1% with respect to the bitumen.

IC C01B

CC 49-1 (Industrial Inorganic Chemicals)

Section cross-reference(s): 51

ST **active carbon** manuf; bitumen carbonization;  
hydrocarbon waste carbonization

IT Bitumens

(**active carbon** manuf. from)

L57 ANSWER 16 OF 17 HCA COPYRIGHT 2004 ACS on STN

49:87181 Original Reference No. 49:16414e-g What to do with acid sludge-the Miley process. Miley, G. Hunter (L. Sonneborn Sons, Inc., Petrolia, PA). Petroleum Refiner, 34(No. 9), 138-41 (Unavailable) 1955. CODEN: PEREAK. ISSN: 0096-6517.

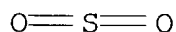
AB Acid sludge produced in the treatment of petroleum fractions with H<sub>2</sub>SO<sub>4</sub> is decompd. by being brought into contact with coke heated to 450-650°F. in a vertical heat exchanger consisting of tubes hung freely from a tube sheet. Excess coke produced by decompn. of acid sludge is removed. A retort with a daily throughput of 50 tons of a typical "white oil" sludge contg. titratable acidity (expressed as H<sub>2</sub>SO<sub>4</sub>) 54.0, H<sub>2</sub>O 8.0, and hydrocarbons 38.0% produces **SO<sub>2</sub>** corresponding to a 95% recovery and 14 tons of coke suitable for the manuf. of CS<sub>2</sub> and **activated charcoal**.

IT **7446-09-5, Sulfur dioxide**

(recovery of, from petroleum-refining acid sludge)

RN 7446-09-5 HCA

CN Sulfur dioxide (8CI, 9CI) (CA INDEX NAME)



CC 22 (Petroleum, Lubricants, and Asphalt)

IT Petroleum refining

(acid sludge from, manuf. of coke and **SO<sub>2</sub>** from)

IT **Coke**

(recovery from **petroleum-refinery acid sludge**)

IT **7446-09-5, Sulfur dioxide**

(recovery of, from petroleum-refining acid sludge)

L57 ANSWER 17 OF 17 HCA COPYRIGHT 2004 ACS on STN

44:52179 Original Reference No. 44:9979i,9980a-g Enol acetates. Young, Frank G. (Union Carbide & Carbon Corp.). US 2511423 19500618 (Unavailable). APPLICATION: US .

AB Enol acetates are obtained in good yields from the condensation of

ketene with ketonic compds. having at least 3 H atoms on the C  $\alpha$  to the keto group. The catalysts used are insol. and can be easily recovered and reused with no loss of activity. The ketonic compds. include aliphatic, aromatic, mixed open-chain and cyclic monoketones,  $\beta$ - and  $\gamma$ -diketones, halogenated ketones, and keto carboxylic acid esters. The catalysts are obtained from the sulfonation and partial oxidation (with concd. H<sub>2</sub>SO<sub>4</sub>, fuming H<sub>2</sub>SO<sub>4</sub>, ClSO<sub>3</sub>H, or SO<sub>3</sub>) of solid carbonaceous materials such as wood, charcoal, coal, **petroleum**, and asphalt **cokes**, polyethylenes, lignite, peat, cotton, and other synthetic resins. Thus, during a 5.12-hr. period at 90-100°, 215 g. ketene (I) was added to an agitated suspension of 63 g. catalyst in 459 g. cyclohexanone; recovery of the catalyst and distn. of the filtrate gave 93.7% (based upon the ketone) of a liquid b<sub>20</sub> 78°. The catalyst was made by adding 200 g. 96% H<sub>2</sub>SO<sub>4</sub> to 150 g. 4-20 mesh hardwood sawdust, then 400 g. 20% fuming H<sub>2</sub>SO<sub>4</sub>, and heating at 80-90° for 2.5 hrs.; the product, washed free of SO<sub>4</sub> -- and dried at 90°, contained 0.88 milliequiv. SO<sub>3</sub>H/g. and 3.59 milliequivs. CO<sub>2</sub>H/g. Similarly, the following were prepd.:

MeC(OAc):CH<sub>2</sub>, b<sub>200</sub> 60° (40.5%), by treating 47 g. catalyst R in 394 g. dry Me<sub>2</sub>CO with 130 g. I for 3.1 hrs. at 55-60°;  
MeCH:C(OAc)CH<sub>2</sub>CO<sub>2</sub>Et, b<sub>5</sub> 80°, from 25 g. catalyst R in 178 g. Et levulinate with 32 g. I for 0.75 hr. at 63-70°;  
MeCOCH:C(OAc)Me, b<sub>5</sub> 65° (40.3%), from 456 g. CH<sub>2</sub>(COMe)<sub>2</sub> and 74 g. catalyst Q with 167 g. I for 4 hrs. at 42-68°;  
p-ClC<sub>6</sub>H<sub>4</sub>C(OBz):CH<sub>2</sub>, b<sub>2</sub> 93° (8.5%), from 480 g. ClC<sub>6</sub>H<sub>4</sub>COMe and 89 g. catalyst N with 90 g. I for 2.15 hrs. at 50-80°;  
PhC(OAc):CH<sub>2</sub>, b<sub>4</sub> 91° (42%), from 507 g. BzOMe and 65 g. catalyst C with 189 g. I for 4.5 hrs. at 90-100°;  
MeCH:C(OAc)Me, b. 117-23° (47.7%), from 408 g. MeCOEt and 60 g. catalyst H with 210 g. I for 5.0 hrs. at 60-4°;  
MeCH:CHC(OAc):CH<sub>2</sub>, b<sub>10</sub> 50° (29.6%), from 370 g. MeCH:CHCOMe and 68 g. catalyst F with 217 g. I for 3 hrs. at 80-100°.

The catalysts were prepd. as follows: Catalyst R, from 100 g. 20-40 mesh bituminous coal treated with 400 ml. 20% fuming H<sub>2</sub>SO<sub>4</sub> at 80° for 2.5 hrs. and then with 5 times its wt. (after washing and drying) of 9% aq. HNO<sub>3</sub> at 100° for 10 hrs.; Q, from 100 g. finely divided **petroleum coke** and 400 g. 20% fuming H<sub>2</sub>SO<sub>4</sub> for 2.5 hrs. at 80°; N, from 100 g. of a sulfite-process wood pulp with 200 g. 96% H<sub>2</sub>SO<sub>4</sub> and then 400 g. 20% fuming H<sub>2</sub>SO<sub>4</sub> for 2.5 hrs. at 80-90°; C, from 100 g. **activated charcoal** from coconut shells with 300 g. 20% fuming H<sub>2</sub>SO<sub>4</sub> for 2.5 hrs. at 80-90°; H, a finely divided sulfonated coal marketed as "Zeo Karb H"; F, from 100 g. finely divided natural graphite with 200 g. 20% fuming H<sub>2</sub>SO<sub>4</sub> for 2.5 hrs. at 80-90°. MeC(OAc):CHCO<sub>2</sub>Et, b<sub>10</sub> 89-90°, d<sub>15</sub> 1.520 1.102, n<sub>30</sub> 1.4675, was prepd. (26.5%) by treating 913 g. AcCH<sub>2</sub>CO<sub>2</sub>Et and 10 g. catalyst with 99 g. I for 1 hr. at 80-90°. The

catalyst was obtained by treating 100 g. 40-mesh bone charcoal contg. 0.18% S and no acid with 400 g. 20% fuming H<sub>2</sub>SO<sub>4</sub> for 2 hrs. at 80-90°, washing, and drying at 100°. An example is given illustrating the unusually long effective catalytic life possessed by these catalysts.

CC 10 (Organic Chemistry)

IT Coke

(petroleum, sulfonated, as catalyst in ketene reaction with ketones and oxo esters)

=> file wpids

FILE 'WPIDS' ENTERED AT 13:08:24 ON 05 AUG 2004

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=> d 155 1-7 max

L55 ANSWER 1 OF 7 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2003-902700 [82] WPIDS

DNN N2003-720983 DNC C2003-256213

TI Control of dusting in bulk material having first electrostatic charge involves separating bulk material into two fractions, imparting second electrostatic charge, opposite to first charge, to first fraction, and mixing two fractions.

DC C04 G04 H09 X25

IN JOHNSON, D M; KENNEY, C W; REEVES, R A; JOHNSON, D

PA (JOHN-I) JOHNSON D M; (KENN-I) KENNEY C W; (REEV-I) REEVES R A;  
(HAZE) HAZEN RES INC

CYC 102

PI WO 2003070862 A1 20030828 (200382)\* EN 21 C10L005-00

RW: AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT  
KE LS LU MC MW MZ NL OA PT SD SE SI SK SL SZ TR TZ UG ZM ZW

W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ  
DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP  
KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ  
NO NZ OM PH PL PT RO RU SC SD SE SG SK SL TJ TM TN TR TT TZ  
UA UG UZ VC VN YU ZA ZM ZW

US 2003178598 A1 20030925 (200382) C09K003-22

AU 2003217549 A1 20030909 (200427) C10L005-00

ADT WO 2003070862 A1 WO 2003-US4740 20030214; US 2003178598 A1  
Provisional US 2002-357540P 20020215, US 2003-367576 20030214; AU  
2003217549 A1 AU 2003-217549 20030214

FDT AU 2003217549 A1 Based on WO 2003070862

PRAI US 2002-357540P 20020215; US 2003-367576 20030214

IC ICM C09K003-22; C10L005-00

ICS C09K003-222

AB WO2003070862 A UPAB: 20031223

NOVELTY - Dusting in a bulk material having a first electrostatic charge is controlled by:

- (1) separating the bulk material into two fractions;
- (2) imparting a second electrostatic charge to the first fraction, where the second electrostatic charge is opposite the first electrostatic charge; and
- (3) mixing the two fractions.

USE - For control of dusting in a bulk material having a first electrostatic charge, or treatment of a solid particulate material. The bulk material is a bulk fuel material, and coal consisting of bituminous coal, subbituminous coal, and lignite (claimed). It includes ore, crushed rock, fertilizer, clay, grain, coke, bulk food products, sulfide ores, carbon-containing materials, such as **activated carbon** and **carbon black**, and other minerals. Solid fuels include oil shale, solid biomass materials, refuse derived fuels (including municipal and reclaimed refuse), char, **petroleum coke**, gilsonite, distillation byproducts, wood byproducts and their waste, shredded tires, peat and waste pond coal fines. Refuse derived fuels include landfill material from which non-combustible materials have been removed. Ores and minerals include gravel and limestone, which is used in cement manufacture, road construction, rail ballast, soil amendment or flue gas sorbent used in **sulfur dioxide** removal, at coal-fired power plants. Bulk food products include bulk grains, animal feed and related byproducts. Bulk grains include wheat, corn, soybeans, barley, oats, and any other grain that are transported and/or stored.

ADVANTAGE - The method has greater effectiveness, and avoids the problems associated with water and chemical sprays. The resultant mixture possesses less dust than untreated material, without further treatment until the material is moved to market and consumed. The electrostatic charges remain effective from the point of application, to the end use of the bulk material, and so subsequent treatment of dust control is reduced or avoided. When a portion of the bulk material is used, no change in the composition of the bulk material occurs. Compared to present methods of dust control, the method is of lower cost, and provides a more durable treatment, greater overall effectiveness, and preservation of product quality. It overcomes the natural tendency for materials to disperse dust. The dust suppression effect of the treatment of materials, continues for at least 50, preferably at least 300 hours after initial treatment.

DESCRIPTION OF DRAWING(S) - The figure is an illustration of a cup charging apparatus.

Dwg.1/2

TECH WO 2003070862 A1UPTX: 20031223

TECHNOLOGY FOCUS - CHEMICAL ENGINEERING - Preferred Parameter: The

first fraction is less than 20 wt.% of the total bulk material. It comprises less than 10% of the total material. The heterologous charge control agent comprises 0.1-20 wt.% of the bulk material. Preferred Method: The particle size of the first fraction is reduced to less than 2.0, preferably less than 0.5 mm, before imparting the second electrostatic charge. The imparting step and charge control agent treatment step involve placing the respective first fraction and charge control agent in an electrostatic field of at least 1 kV/cm; raising the temperature of the respective first fraction and charge control agent in the electrostatic field to between 30-300 degrees C; and maintaining the respective first fraction and charge control agent in electrostatic field and at the raised temperature, for between 5-600 minutes. The first fraction is treated with a corona charge. The first fraction is cooled to ambient temperature, while maintaining the electrostatic field. A heterologous charge control agent is mixed with the bulk material, where the heterologous charge control agent has a second electrostatic charge. The charge control agent is mixed with a first portion of the bulk material, before being mixed with the remaining portion of the bulk material, where the first portion is between 0.5-25% of the bulk material.

Preferred Material: The heterologous charge control agent is toner, titanium dioxide, coal, plaster of paris, pitch coal blend, or sodium orthophosphate.

FS CPI EPI  
 FA AB; GI  
 MC CPI: C04-A08; C04-A09F; C04-D02; C04-D03; C05-C06; C11-C09; C14-T;  
 G04-B03; H09-H  
 EPI: X25-H02B  
 CMC UPB 20031223  
 M6 \*01\* M905 R528 R530

L55 ANSWER 2 OF 7 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2003-843461 [78] WPIDS

DNN N2003-674031 DNC C2003-236984

TI Secondary alkali metal ion cell, for e.g. power tools, comprises composite negative electrode element, composite positive electrode element and polymer electrolyte-separator element with polymeric matrix.

DC A85 L03 X16 X21 X25

IN HUANG, S

PA (HUAN-I) HUANG S

CYC 1

PI US 2003157409 A1 20030821 (200378)\* 10 H01M010-40

ADT US 2003157409 A1 Provisional US 2002-358593P 20020221, US  
 2003-368926 20030218

PRAI US 2002-358593P 20020221; US 2003-368926 20030218

IC ICM H01M010-40

ICS H01M004-50; H01M004-52; H01M004-58; H01M004-62; H01M004-66  
AB US2003157409 A UPAB: 20031203

NOVELTY - A secondary alkali metal ion cell comprises:

- (i) composite negative electrode element comprising an **active** material, a **carbon** black, a polymeric binder and a current collector;
- (ii) composite positive electrode element comprising an **active** material, a **carbon**, a polymeric binder, a catalyst and a current collector; and
- (iii) polymer electrolyte-separator element with a polymeric matrix.

DETAILED DESCRIPTION - A secondary alkali metal ion cell comprises:

- (i) composite negative electrode element comprising an **active** material, a **carbon** black, a polymeric binder and a current collector;
- (ii) composite positive electrode element comprising an **active** material, a **carbon**, a polymeric binder, a catalyst and a current collector; and
- (iii) polymer electrolyte-separator element, which is a multilayered system sandwiched between the negative and positive electrodes, comprising a polymeric matrix in which a liquid electrolyte is immobilized, a filler, a separator and a catalyst.

An INDEPENDENT CLAIM is also included for a method for making a secondary lithium ion cell comprising positioning a cathode comprising lithium species intercalated in a carbon hosting compound opposite an anode comprising lithium ions intercalated in a carbon hosting compound, and positioning a polymer electrolyte-separator between the cathode and the anode, where the polymer electrolyte-separator comprises an inorganic liquid electrolyte immobilized in a hosting polymer matrix.

USE - The secondary alkali metal ion cell is used for making a rechargeable lithium stacked cell used in all kinds of applications i.e. portable devices, power tools, electric vehicles and even stationary systems.

ADVANTAGE - The secondary alkali metal ion cell is non-flammable, health safe, environmentally friendly and cost effective.

DESCRIPTION OF DRAWING(S) - The figure shows a cross-section of the polymer gel battery with stacked electrodes.

Battery 10

Battery cell 12

Negative electrode element 14

Positive electrode element 16

Polymer electrolyte-separator-element 18

Stainless steel can 22

Dwg.1/3

TECH US 2003157409 A1UPTX: 20031203



TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Device:  
The secondary alkali metal ion cell comprises:

(a) negative electrode comprising graphite (90%) active material, polytetrafluoroethylene polymeric binder (10%) and stainless steel mesh current collector;

(b) positive electrode comprising lithium oxide (40%) and vanadium oxide (20%) **active material, carbon** black (32%), polytetrafluoroethylene polymeric binder (8%) and stainless steel mesh current collector; and

(c) polymer electrolyte-separator element which is a multilayered system sandwiched between the negative and positive electrodes comprising a polyvinylidene-fluoride polymeric matrix in which a  $\text{LiAlCl}_4 \cdot \text{SOCl}_2$  liquid electrolyte is immobilized, and a microporous membrane separator.

Preferred Component: The liquid electrolyte is an inorganic solution comprising solvent and solvate.

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Material: The active material of the negative electrode element comprises graphite, carbonaceous materials, **petroleum coke**, **activated carbon**, metal alloys and/or

intermetallic compounds. The active material of the positive electrode comprises lithium intercalation compounds, lithium salts and/or lithium oxides.

Preferred Component: The current collector of the negative electrode element comprises copper, nickel or stainless steel. The lithium intercalation compound comprises lithium cobaltate, lithium niobate, lithium manganate or doped solid solution  $\text{Li}_{1-x}\text{Ni}_x\text{Co}_y\text{Mn}_{1-x-y}\text{O}_2$ . The carbon of the positive electrode element is amorphous or graphitized materials in the form of high surface area powders to fibers. The current collector of the positive electrode comprises nickel, stainless steel or aluminum. The solvate of the inorganic solution comprises lithium hexaphosphate,  $\text{LiAlCl}_4$ ,  $\text{LiGaCl}_4$  and/or  $\text{Li}_2\text{B}_{10}\text{Cl}_{10}$ . The filler is high surface area particles comprising fumed silica, alumina or titania.

M = Mn, Al, Ti, Mg, Cr.

Preferred Compound: The lithium salt comprises lithium chloride, lithium sulfide, lithium fluoride, lithium phosphide, lithium nitride, lithium carbonate, lithium sulfate, lithium nitrate, lithium aluminum chloride or lithium phosphate. The lithium oxide comprises lithium oxide, lithium peroxide or lithium hydroxide.

Preferred Catalyst: The catalyst of the positive electrode element comprises transition metal oxides, i.e. vanadium oxide,  $\text{CoO}_2$ , manganese oxide, tin oxide, cupric oxide, chromium oxide, ferric oxide, and metal salts i.e. aluminum chloride. The catalyst is a chloride comprising boron chloride, aluminum chloride, phosphorus chloride, sulfur chloride, and/or gallium chloride.

Preferred Solvent: The solvent in the inorganic solution comprises silicon tetrachloride,  $\text{S}_2\text{Cl}_2$ , sulfur dichloride, **sulfur**

dioxide, vanadium (IV) chloride, thionyl chloride and/or sulfuryl chloride.

TECHNOLOGY FOCUS - POLYMERS - Preferred Component: The polymeric binder of the positive and negative electrode elements comprises polytetrafluoroethylene, ethylene-tetrafluoroethylene, polyimide and/or polyvinylidene-fluoride. The polymer matrix is a porous layer of polymeric materials comprising polyvinylidene-fluoride, polyurethane, polyethylene-oxide, poly(meth)acrylate, polyacrylonitrile, polyacrylamide, polyvinylacetate, polyvinylpyrrolidone, polyfluorosilicone, polyfluoropropylmethylsilicone, polyfluoropropylmethylcyclotetrasiloxane, polydimethylsiloxane or polyepoxy. The separator is a microporous membrane made of polymers comprising polytetrafluoroethylene, ethylene-tetrafluoroethylene, polyimide, polymethylpentene, polypropylene, polyethylene or polyolefins; or a microporous mat or nonwoven sheet made of glass fibers or polymeric fibers.

FS CPI EPI

FA AB; GI

MC CPI: A12-E06A; A12-E06B; L03-E01B5B

EPI: X16-B01F1; X16-E01C1; X16-E01E; X16-E02; X16-E09; X16-J01A;  
X16-J08; X21-A01F; X21-B01A; X25-R01A

PLE UPA 20031203

[1.1] 018; P1456 P1445 F81 F86 D01 D11 D50 D82 Si 4A

[1.2] 018; R00975 G0022 D01 D12 D10 D51 D53 D59 D69 D82 F- 7A;  
R00326 G0044 G0033 G0022 D01 D02 D12 D10 D51 D53 D58 D82;  
H0022 H0011; P1150; P0533

[1.3] 018; G0635 G0022 D01 D12 D10 D23 D22 D31 D41 D51 D53 D58  
D75 D86 F71 G0339-R G0260 D26 D63 F41 F89; R00975 G0022  
D01 D12 D10 D51 D53 D59 D69 D82 F- 7A; R00363 G0555 G0022  
D01 D12 D10 D51 D53 D58 D69 D82 F- 7A; R00835 G0566 G0022  
D01 D11 D10 D12 D51 D53 D58 D63 D84 F41 F89; R00817 G0475  
G0260 G0022 D01 D12 D10 D26 D51 D53 D58 D83 F12; R00444  
G0453 G0260 G0022 D01 D12 D10 D26 D51 D53 D58 D83 F70 F93;  
R15485 G0044 G0033 G0022 D01 D02 D12 D10 D53 D51 D58 D86;  
R00642 G0340 G0339 G0260 G0022 D01 D11 D10 D12 D26 D51 D53  
D58 D63 D84 F41 F89; H0000; P1150; P0088; P0102; P0511

[1.4] 018; P1081-R F72 D01

[1.5] 018; P1592-R F77 D01

[1.6] 018; P8004 P0975 P0964 D01 D10 D11 D50 D82 F34

[1.7] 018; D50 D69 D84 F86 F- 7A D11 D10; M9999 M2084; P1445-R  
F81 Si 4A

[1.8] 018; P0464-R D01 D22 D42 F47

[1.9] 018; ND01; K9745-R; B9999 B4239; K9905; Q9999 Q6791; Q9999  
Q8060; B9999 B5221 B4740; Q9999 Q7341 Q7330; Q9999 Q7409  
Q7330

L55 ANSWER 3 OF 7 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
 AN 2002-636796 [68] WPIDS  
 DNC C2002-179792  
 TI Combustible pellet comprising municipal solid waste, has specific water content and preset fuel value.  
 DC H09  
 IN PHILIPSON, J  
 PA (PHIL-I) PHILIPSON J  
 CYC 101  
 PI WO 2002070635 A2 20020912 (200268)\* EN 41 C10L005-46  
 RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC  
 MW MZ NL OA PT SD SE SL SZ TR TZ UG ZM ZW  
 W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ  
 DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP  
 KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ  
 NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ  
 UA UG US UZ VN YU ZA ZM ZW  
 US 2002184816 A1 20021212 (200301) C10L005-40  
 EP 1370631 A2 20031217 (200402) EN C10L005-46  
 R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK  
 NL PT RO SE SI TR  
 AU 2002238321 A1 20020919 (200433) C10L005-46  
 ADT WO 2002070635 A2 WO 2002-CA273 20020305; US 2002184816 A1 US  
 2001-801182 20010306; EP 1370631 A2 EP 2002-704514 20020305, WO  
 2002-CA273 20020305; AU 2002238321 A1 AU 2002-238321 20020305  
 FDT EP 1370631 A2 Based on WO 2002070635; AU 2002238321 A1 Based on WO  
 2002070635  
 PRAI US 2001-801182 20010306  
 IC ICM C10L005-40; C10L005-46  
 AB WO 200270635 A UPAB: 20021022  
 NOVELTY - A combustible pellet comprising municipal solid waste, has a water content of less than 10 weight% (wt.%) and a fuel value of at least 10000 BTU per pound.  
 DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for formation of combustible pellet from municipal solid waste, which involves removing solid hazardous waste and separating recyclable products from municipal solid waste, shredding and pulverizing the resulting product to form a fluff with water content of less than 10 wt.%, and compacting the fluff.  
 USE - As combustible pellet comprising municipal solid waste.  
 ADVANTAGE - The combustible pellet produced from municipal solid waste, has high fuel value and low water content, and produces low ash content after combustion. Production of combustible pellet from municipal solid waste reduces the need for landfill sites and provides a long term solution to waste disposal. The process recycles more products form waste stream and provides fuel that burns cleaner than coal or oil.  
 DESCRIPTION OF DRAWING(S) - The figure shows the schematic

representation of flow scheme of municipal solid waste treatment process.

Dwg.1/6

TECH WO 200270635 A2UPTX: 20021022

TECHNOLOGY FOCUS - ORGANIC CHEMISTRY - Preferred Composition: The pellet also comprises waste substance(s) of high fuel value chosen from hydrocarbon, carbon, safe industrial waste, commercial and institutional waste, wood, rubber, fibrous material, carpet, underlay, vinyl flooring, rubbers, tires, automotive insulation, compost residue, coal dust, fabrics, leather, furniture, peat, hemp, jute, sugarcane, coconut husks, corn husks, rice husks, sewage sludges, and/or wood and paper fibers. The hydrocarbon is **petroleum coke**, the carbon is bottom ash, the rubber is synthetic rubber, the wood is chosen from barks, chips, saw dust, plywood, particle board, pallets, skids, bush, tree branches and yard waste, and fibers are chosen from corrugated cardboard, newspaper, packaging, box board, aseptic board and pulp sludges. The municipal solid waste is free of recyclable materials such as glass, metals, plastics and paper. Emissions released from combustion of the pellet contain less than 17 mg/Rm3 of particulate matter, less than 14 mug/Rm3 of cadmium, less than 142 mug/Rm3 of lead, less than 20 mug/Rm3 of **mercury**, less than 0.14 ng/Rm3 of dioxin/furan, less than 27 mg/Rm3 of hydrochloric acid, less than 56 mg/Rm3 of **sulfur dioxide**, and less than 110 ppm of nitrogen oxides. The pellet on combustion at 1150degreesC in air produces less than 10 wt.% of bottom ash. The pellet has fuel value of preferably 12500-14000 BTU per pound, water content of preferably 1-7 wt.%, length of 3 cm or more, preferably 5-15 cm, and width of 1 cm or more, preferably 3.5-8 cm, and has circular cross-section. Preferred Process: Anaerobic digestion is performed after separating recyclable materials, for 15-25 days. Gas produced from digestion is used to drive a gas-fired turbine engine or used to dry the waste. The amount of municipal solid waste and the amount of additional waste substance are controlled so that the pellet so obtained has fuel value of 10000 BTU per pound or more.

FS CPI  
FA AB; GI  
MC CPI: H09-F03  
DRN 1704-U; 1784-U

L55 ANSWER 4 OF 7 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 2002-293580 [34] WPIDS

DNN N2002-229125 DNC C2002-086424

TI Production of fuel gas by total gasification of household waste, pyrolyzes, further gasifies both condensate and coke, then combines all resultant permanent gases.

DC H09 Q73

PA (VEAG-N) VEAG VER ENERGIEWERKE AG

CYC 1

PI DE 10047787 A1 20020328 (200234)\* 8 C10B053-00

ADT DE 10047787 A1 DE 2000-10047787 20000920

PRAI DE 2000-10047787 20000920

IC ICM C10B053-00

ICS C10G011-05; F23G005-027

AB DE 10047787 A UPAB: 20020528

NOVELTY - Low temperature carbonization gas (4a) produced, which includes permanent gases, is cooled. Hydrocarbons (7b, 9a) in the condensate are further gasified in a heterogenous catalytic process at elevated temperature. They are converted into further permanent gases (26) in the presence of steam. Low temperature coke is converted by partial combustion and partial gasification into permanent gases (28a). All the permanent gases produced are combined. They are purified in a basic (i.e. alkaline) scrubber (8) and following compression, they are mixed with natural gas (16). The fuel gas produced is suitable for energy release, especially in the combustion chambers of gas turbines.

DETAILED DESCRIPTION - Preferred features: Hydrocarbons in the low temperature carbonization gas having condensation temperatures above 70 deg. C, are converted. A known heterogeneous high temperature catalyst (26) at 750 deg. C-1000 deg. C in the presence of steam, is employed. The converted products have condensation temperatures below 70 deg. C. The catalyst is in fixed bed form. A known cracking catalyst (6) working at 500 deg. C-650 deg. C is connected into the low temperature carbonization gas line (5a). This converts the low temperature tars into hydrocarbons with condensation temperatures below 70 deg. C. An oily phase (9) is condensed from the low temperature carbonization gases, and is separated from its suspension in wash water. It is sent to the high temperature catalyst, for conversion into permanent gases (26a). Thermal energy from controlled partial combustion of the low temperature coke (3c) is employed in the **fluidized bed coke** gasifier (25) to bring the catalyst (26) to the required temperature. Controlled partial combustion of the coke takes place in a suitable mixture of oxidant gas and steam, at 900 deg. C-1100 deg. C, producing permanent gases CO and H<sub>2</sub> (26a). Together with the recycled (33) condensates (7b, 9a) of the hydrocarbon compounds, additional quantities of hydrocarbons from various sources are supplied directly to the high temperature catalyst and gasified.

USE - To make a fuel gas from household- and similar wastes by pyrolysis with subsequent conversion of the low temperature carbonization gas, condensate and coke into permanent gases. To produce a fuel suitable for combustion in a gas turbine (claimed).

ADVANTAGE - Thermally-efficient conversion of the waste into permanent gases is achieved in a largely self-supporting process. Calorific value and Wobbe index are adjusted for turbine combustion,

by addition of natural gas. This renders the process largely independent of expected variation in the waste feedstock. **SO<sub>2</sub>**, **H<sub>2</sub>S**, **Cl** and **F** are removed in the basic scrubber using e.g. **Ca(OH)<sub>2</sub>** suspension. Fabric- and **activated carbon** filtration, retains heavy metals. Environmental requirements are met. Usefully, the process also catalytically-converts used oil, fats and greases. Redundant catalyst stages enable burn-off with continued production. The rotary pyrolysis furnace is operated at up to 550 deg. C, destroying halogen compounds without producing furanes and dioxins.

DESCRIPTION OF DRAWING(S) - A schematic flow diagram of the plant is presented.

low temperature coke 3c  
 low temperature carbonization gas 4a  
 low temperature carbonization gas line 5a  
 cracking catalyst 6  
 hydrocarbons 7b, 9a  
 basic scrubber 8  
 oily phase 9  
 natural gas 16  
 heterogeneous high temperature catalyst 26  
 further permanent gases 26a  
 permanent gases 28a  
**fluidized bed coke** gasifier 25  
 recycled gas line 33

Dwg.1/2

FS CPI GMPI  
 FA AB; GI  
 MC CPI: H09-C

L55 ANSWER 5 OF 7 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
 AN 1985-147011 [25] WPIDS  
 DNC C1985-063995

TI **Sulphur oxide** and nitrogen oxide cpds. removal  
 from waste gas - in 2 stages by adsorption of **sulphur oxide** and catalytic redn. of nitrogen oxide with ammonia.

DC E36 J01  
 PA (FRUH-I) FRUHBUSS H  
 CYC 3

PI DE 3342500 A 19850613 (198525)\* 12  
 JP 60132628 A 19850715 (198534)  
 US 4629609 A 19861216 (198701)  
 US 4710363 A 19871201 (198750)  
 DE 3342500 C 19890406 (198914)

ADT DE 3342500 A DE 1983-3342500 19831124; JP 60132628 A JP 1984-246384  
 19841122; US 4629609 A US 1984-674018 19841121; US 4710363 A US  
 1986-910363 19860922

PRAI DE 1983-3342500 19831124

IC B01D053-34; B01J008-00; B01J020-20; B01J021-04; C01B017-00;  
C01B021-00

AB DE 3342500 A UPAB: 19930925

Removal of **SOx** and NOx from waste gases involves adsorption of most of the **SOx** in a first stage and then redn. of the NOx to N<sub>2</sub> with NH<sub>3</sub> in a second stage. The waste gas is practically freed from **SOx** in one or more first stages, then the prepurified gas, after mixing with NH<sub>3</sub>, is repurified by redn. of NOx to N<sub>2</sub> with catalysts having an adsorption capacity of under 10 g, pref. under 4 g **SO2/kg**.

The **SOx** content is reduced to 400 ppm by prepurification by adsorption with **activated charcoal** or by wet and opt. subsequent dry scrubbing. In particular, adsorption is carried out with a travelling bed of **activated charcoal** in a first stage and with stationary beds in the subsequent stages as required. The NOx is reduced to N<sub>2</sub> in a stationary catalyst bed, the catalyst consisting (partly) of (**petroleum**) **coke** contg. metal oxide.

USE/ADVANTAGE - The process is useful for removing **SOx** and NOx in varying amts. in waste gases, esp. from the combustion of fuels and nitrogenous waste. Since the catalyst used in the second stage is effective for very long periods, continuous renewal is unnecessary, allowing the use of 2 simple interchangeable vessels instead of complex and unreliable travelling bed reactors.  
0/1

ABEQ DE 3342500 C UPAB: 19930925

**SOx** and NOx are removed from waste gases by adsorbing most of the **SOx** followed by reduction of the NOx using a catalyst having an absorptivity of less than 10, pref. less than 5g **SOx** per kg.

The **SOx** content is pref. reduced to 50 ppm. The catalyst is a metal oxide in a stationary bed of coke obtd. from the processing of crude oil.

ADVANTAGE - Premature soiling and redn. of the activity of the catalyst is prevented.

ABEQ US 4629609 A UPAB: 19930925

A waste gas, contg. N and **S oxides**, is treated by initially removing the **S oxides** with adsorptive coke capable of removing about 40g of **SO2/kg** of coke. NH<sub>3</sub> is then introduced into the treated waste gas and the mixture contacted with a catalyst contg. Al, Cu, Co, Ni, Fe and/or V. oxide supported on coke. This serves to reduce the N oxides to N and allow the recovery of a relatively clean waste gas stream.

ADVANTAGE - Treatment provides a low cost way of cleaning waste gas. The used coke can be burnt to recover useful heat.

ABEQ US 4710363 A UPAB: 19930925

**SOx** and NOx are removed from waste gases by a method in which all the **SOx** is removed by contact with adsorptive

coke with adsorption capacity for **SO<sub>2</sub>** of more than 40g **SO<sub>2</sub>** per kg of coke. **NH<sub>3</sub>** is then introduced into the gas, which is brought into contact with a catalyst with adsorptive capacity for **SO<sub>2</sub>** of less than 10g per kg of catalyst. Effective ingredient is at least one member of the gp. Al, Cu, Co, Ni, Fe and V oxide, supported on a granular refractory material, e.g. **Al<sub>2</sub>O<sub>3</sub>**, for reducing the **NO<sub>x</sub>** to **N<sub>2</sub>**. The treated gas is then recovered. For the second stage, cokes produced from oil treatment, impregnated with catalyst, are preferred.

ADVANTAGE - Reactivation of catalysts can be done in one reactor, while using a second, avoiding the problems of moving bed treatment in continuous operation.

FS CPI

FA AB

MC CPI: E31-F01; E31-H01; J01-E02B; J01-E02D; N02-A01; N02-D01; N03-C; N04-A

DRN 1508-S; 1544-S; 1549-S; 1784-U; 1953-U

CMC UPB 19930924

M3 \*01\* C107 C108 C307 C520 C730 C800 C801 C802 C803 C804 C807 M411  
M750 M903 M910 N163 N514 N515 Q431 Q436 Q439  
M3 \*02\* C108 C216 C316 C540 C730 C800 C801 C802 C803 C804 C805 M411  
M750 M903 M910 N163 N514 N515 Q431 Q436 Q439  
M3 \*03\* A313 A423 A426 A427 A428 A429 A940 M411 M730 M903 N163 Q421  
Q431 Q436 Q439

L55 ANSWER 6 OF 7 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN

AN 1976-96890X [52] WPIDS

TI Nitrogen oxide removal from waste gas - using catalyst of copper or nickel melt adhered to a carrier by a plasma technique.

DC E36 J01

PA (FUJD) FUJIKURA CABLE WORKS LTD

CYC 1

PI JP 51128679 A 19761109 (197652)\*

PRAI JP 1974-73426 19740628; JP 1975-77295 19741029

IC B01D053-34; B01J001-10; B01J023-72; B01J037-02

AB JP 51128679 A UPAB: 19930901

A catalyst for oxidn. of nitrogen oxides contained in waste gas is prepd. by melt sticking copper or nickel on the surface of a carrier consisting of aluminous or **carbon** aceous material ( **activated charcoal**, **petroleum** or coal **coke**) having desired shape, by using plasma heating. For example, **CuO** powder is melt injected by plasma onto the surface of the carrier consisting of **activated charcoal** which is moulded to ca. 5 mm. particles. Pref. particle size of the **CuO** powder is 100-300 mesh. Pref. gas used as plasma is argon, or hydrogen, and 60 V, 400 A d.C. is used. The catalyst is used in a dry process, and may be used for a long time without being appreciably affected even by the coexistence of **SO<sub>2</sub>** and



H2O.  
FS CPI  
FA AB  
MC CPI: E31-H; J01-E02; J04-A01; J04-A02  
CMC UPB 19930924  
M3 \*01\* C800 C730 C108 C107 C307 C803 C802 C807 C804 C801 C520 N160  
M740 M750 M411 M417 M424 M902

L55 ANSWER 7 OF 7 WPIDS COPYRIGHT 2004 THOMSON DERWENT on STN  
AN 1974-23378V [13] WPIDS  
TI **Activated carbon** mfr from heavy oil fractions -  
by sulphonation in organic media and activation.  
DC E36 H08  
PA (MAZN) MARUZEN OIL CO LTD  
CYC 6  
PI DE 2346230 A 19740321 (197413)\*  
NL 7312632 A 19740318 (197413)  
FR 2200196 A 19740524 (197425)  
JP 49049892 A 19740515 (197548)  
US 3940344 A 19760224 (197610)  
GB 1444122 A 19760728 (197631)  
JP 55000331 B 19800107 (198005)  
DE 2346230 B 19800221 (198009)  
NL 170264 B 19820517 (198223)  
PRAI JP 1972-92551 19720914  
IC C01B031-08  
AB DE 2346230 A UPAB: 19930831  
High - boiling petroleum products are carbonised by sulphonation in  
org. media, the solvent distilled off, and the product activated by  
usual methods e.g. by heating at 700 - 1100 degrees C in steam or  
CO2. Suitable starting materials are bitumen, residues from thermal  
or catalytic cracking process, **petroleum** pitch or  
**coke**. Sulphonation is with fuming H2SO4, **SO3**,  
chlorosulphonic acid, conc. H2SO4, complex salts of **SO3**  
and a base, etc. and an oxidising agent e.g. KMnO4 or NHO3 may also  
be present. Suitable solvents are halogenated lower aliphatic  
cpds., DMF, dioxane, acetic acid and benzene. Reaction is at 0 -  
300 degrees C for 0.5 - 10 h. until a softening pt. of at least 700  
degrees C is obtained.

FS CPI  
FA AB  
MC CPI: E31-N; H08-E  
CMC UPB 19930924  
M3 \*01\* C810 C106 N000 Q411 Q412 Q417 Q419 M720 Q508 M411 M902